

Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, January 18, 2019 9:07 AM
To: Waddington, Zac
Cc: Paylor, Adrienne
Subject: FW: New Fish Health Reporting Templates

Hey Zac, I really need to get this out today...are you available to review the email?

Adrienne, do you have any comments?

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Sandberg, Krista
Sent: January-17-19 9:52 AM
To: Waddington, Zac
Subject: New Fish Health Reporting Templates

Hey Zac, here's my draft – Bernie also offered to review this, but I think you and I can do it. Any thoughts?

Krista.

[REDACTED]

My name is Krista Sandberg and I work with DFO's Aquaculture Management Division. As I'm sure you are aware, we are working towards increasing the consistency and accuracy of industry reporting with regards to Fish Health. We have developed three new reporting templates for Mortality Events, Fish Health Events and Sea Lice Overabundance Notifications which have already been shared with industry with a request for feedback. We received positive feedback from licence holders, and incorporated some improvements. These new templates are not intended to increase regulatory burden, and I hope that they will help to provide clarity on reporting expectations as well as modernize our data management systems.

Mortality Events – this template will replace the current Appendix V-A (Urgent Notification (& Follow-Up Reports) required by Conditions of Licence 4.4(b)(i) and 4.4(b)(ii). New information requested includes the pens affected (optional), daily inventory for the duration of the event, the average weight of affected fish, and a column to describe other contributing factors that may have resulted in mortality in addition to the primary probable cause.

Fish Health Events – this template will be used to notify the Department of a Fish Health Event, as per Condition of Licence 4.5(c). It includes structured drop down lists for diagnoses and mitigation as well as details pertaining to the size of the fish and the pens affected. We also provide additional clarity pertaining to the definitions of New, Ongoing and Relapsing events in the "Guidance" tab.

Sea Lice Overabundance Notification – this new template will be used to notify the Department when a the sea lice abundance at a facility exceeds the three motile threshold as per Condition of Licence 7.3. It includes a structured drop down list for planned mitigation and requests the current inventory at the facility to allow us to calculate an estimate the absolute inventory of lice on the farm.

When these templates are released, they will be accompanied by a Bulletin (draft attached) that will clearly outline these expectations and clarify some elements of our current licence. However, since these templates will effectively become part of the Conditions of Licence, I am hoping to obtain support from the BC Salmon Farmer's Association to distribute and use these new reporting tools prior to the issuance of the new Marine Finfish Aquaculture licences in 2022. I am happy to discuss these changes with you and answer any questions that you may have. Please call me at 250 286 5835 at your convenience.

Thank you for your time,

Krista Sandberg

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s.16(2)(c)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, January 18, 2019 1:19 PM
To: Paylor, Adrienne
Subject: RE: November sea lice report ready for your review

Yes, definitely calming down. There are a handful of farms still active and they are all just under threshold. I believe some that were over last month even went down naturally which is good to see. The Steamer exceedance was before treatment and they were down to almost zero by the end November as well. Good news! I'm working on December counts in the next couple of days.

Krista.

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From: Paylor, Adrienne
Sent: January-17-19 3:38 PM
To: Sandberg, Krista
Subject: RE: November sea lice report ready for your review

s.16(2)(c)
s.21(1)(b)

Approved thanks,
Looks like the west coast is calming down.....or the farms are empty? ☺ [REDACTED] ☺

From: Sandberg, Krista
Sent: January-17-19 3:32 PM
To: Paylor, Adrienne
Subject: FW: November sea lice report ready for your review

Hi Adrienne, November sea lice report ready for your review: [\\Dcbscvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2018\2018 Farm Level Sea Lice Summary.xlsx](#)

Krista Sandberg
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From: Waddington, Zac
Sent: January-16-19 3:55 PM
To: Sandberg, Krista; McConnachie, Sarah
Subject: RE: November sea lice report ready for your review

I took a look through and it looks good to my eye. Sarah-remind me to sit down with you and go over in more detail about what Krista and I have decided on regarding reporting, particularly for bath treatments.

Zac

From: Sandberg, Krista
Sent: January-15-19 10:42 AM
To: McConnachie, Sarah; Waddington, Zac
Subject: RE: November sea lice report ready for your review

I've added some comments to your questions. Let me know if these answers satisfy your concerns. Good catch on the two sites that had not indicated treatments when they were planned. From what I can tell, no treatments actually occurred [REDACTED] I'd guess it was a natural decline since a treatment would have brought the abundance much lower if it was successful.

Zac, can you please review this one prior to posting until Sarah is more comfortable?

Krista.

Krista Sandberg
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From: McConnachie, Sarah
Sent: January-07-19 9:40 AM
To: Sandberg, Krista; Waddington, Zac
Subject: RE: November sea lice report ready for your review

I took a crack at this – but added mostly questions as I've begun to sort through this data for the 1st time. Zac and I still haven't gotten a chance to sit down and discuss his process, so hopefully the Qs make sense. I also made some abundance cells red as they were not highlighted previously. Mostly I'm curious if pre-Tx counts are required for each month as I noticed for some sites they are, but for others aren't.

Sarah

From: Sandberg, Krista
Sent: December-24-18 8:59 AM
To: Waddington, Zac; McConnachie, Sarah
Subject: November sea lice report ready for your review

s.16(2)(c)

s.19(1)

s.21(1)(b)

Hi Zac and Sarah,

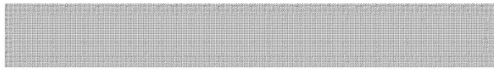
The November sea lice report is ready for your review. I know you're both out of the office [REDACTED] but let's plan to have this one ready for posting when I return mid-January. Nothing too exciting. A few facilities very slightly higher numbers in Discovery area, but plans for treatment in the new year. They don't say what type of treatment.

Summary File:

\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2018\2018 Farm Level Sea Lice Summary.xlsx

Calculator:

\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2018\SL Farm Level Calculator 2018.xls



Krista Sandberg

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s.16(2)(c)

s.19(1)



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No further information has been removed or severed from this page

Wilkinson, Davida

From: Waddington, Zac
Sent: Saturday, January 19, 2019 12:30 PM
To: Sandberg, Krista
Cc: Paylor, Adrienne; Taekema, Bernie John
Subject: RE: Bulletin revisions
Attachments: Draft Urgent Notifications Bulletin.doc

Wow! Thank god you took a look at this, your edits were all great improvements to the document, thanks very much for reviewing it. I've attached the version, I accepted virtually all your changes and I agree with your interpretation. I've very happy with this bulletin now, and assuming we get support from the BCSFA, I think we should be good to send this out with the new templates ASAP. Sorry I didn't get a chance to review your email Krista before COB Friday, but as I said I think it's excellent and so far as I'm concerned you can send it out whenever.

Let me know if you need anything else,

Zac

From: Sandberg, Krista
Sent: January-18-19 12:17 PM
To: Waddington, Zac
Cc: Paylor, Adrienne
Subject: Bulletin revisions

Hi Zac,

Please have a look at the attached bulletin, with some edits – sorry I didn't look at this closer in the past, but better late than never, right? Adrienne has approved the email, but I think you need to re-approve the bulletin before we send it out to BC Salmon Farmers. I will do that next week as there is no point in sending it out on a Friday afternoon.

It appears that the issue with the templates that we chatted about yesterday wasn't as big of a deal as I had initially thought. Turns out that I had an old copy of the appendices and didn't realize that the new licence had removed the FH event reporting template when the MbyC template was enhanced. That was a silly decision! Anyways, I just updated the letter to include some references to the CoLs for added clarity as we discussed.

I also have some suggestions for the sea lice section which you will see in my draft attached. I think that there was some confusion over the submission and implementation of plans and timings, so here is my interpretation that I've tried to communicate in the bulletin:

During outmigration – must report exceedance within 7 days (7.3) with a plan, and IMPLEMENT plan within 15 days (6.4)

Outside outmigration – must report exceedance in monthly sea lice report (7.1) and PROVIDE a plan to the Department within 30 days. (6.5)

Since you're on the road, I've copied the CoLs into this email so you can have access to them:

6.4 Starting March 1, 2017, the licence holder must conduct annual sampling between March 1 and June 30 for the term set out in this licence. The licence holder cultivating Atlantic salmon and trout must carry out a sea lice abundance assessment every two weeks, at minimum, for fish

held in containment structures for more than 30 calendar days. Where data collected in Appendix VI-A indicates the sea lice abundance threshold of three motile *Lepeophtheirus salmonis* has been exceeded, the licence holder must:

- (a) **within 15 calendar days** of the discovery, **implement** a plan which will reduce the absolute sea lice inventory within the containment structure array; and
- (b) notify the Department as per section 7.1 and 7.3.

6.5 Starting **July 1, 2016**, the licence holder must conduct sampling annually between July 1 and February 28 for the term set out in this licence. The licence holder cultivating Atlantic salmon and trout must carry out a sea lice abundance assessment once every month for fish held in containment structures for more than 30 calendar days. Where data collected in Appendix VI-A indicates the sea lice abundance threshold of three motile *Lepeophtheirus salmonis* has been exceeded, the licence holder must:

- (a) increase monitoring to at least once every two weeks;
- (b) within **30 calendar days** of the first discovery, **provide** a plan to address the exceedance to the Department, for its considered response; and
- (c) notify the Department as per section 7.1.

7.1 The licence holder, cultivating Atlantic Salmon and trout, must submit to the Department starting **July 15, 2016** monthly reports on the 15th of each month thereafter for the term of this licence as set out in section 6.4 and 6.5, using the template **in Appendix VI-A**.

7.3 Starting March **1, 2017 to June 30, 2017** and annually every March 1st to June 30th period for the term of this licence, should the sea lice abundance threshold exceed three motile *Lepeophtheirus salmonis* per cultivated salmonid, the licence holder must report to the Department for its considered response, not later **than seven calendar days** after the discovery:

- (a) the abundance results of the sea lice monitoring; and
- (b) **the plan** as outlined in section 6.4 including actions and management response to be initiated.

Krista Sandberg

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Courtenay, (C.-B.)
V9N 2M2

DATE

To Whom It May Concern,

RE: Urgent Notifications Templates

The Aquaculture Management Division of Fisheries and Oceans Canada (the Department) is undertaking a modernization of our data management system to allow increased utility and accuracy of our data. As part of this process, we have updated the reporting templates for industry notifications of: 1) Fish Health Events (FHE), 2) Mortality Events (ME), and 3) Sea lice over threshold. We anticipate these new templates will allow more consistent reporting by industry, without any increased regulatory burden.

The implementation of the new reporting templates gives us an opportunity to clarify some specific key elements on how notifications are reported to the Department. These elements are as follows:

1. Fish Health Event (FHE) reporting:

- FHEs that are reported to the Department as per Condition of Licence (CoL) 4.5(c) must be reported using the new template. Only therapeutic details as per CoL 4.5(d) will be reported in the existing Appendix V-B Mortality by Category.
- A FHE must be reported wherein any suspected or active disease occurrence has warranted veterinary involvement *and* mitigative action.
 - Site quarantine and/or enhanced biosecurity (e.g. visiting last) would constitute mitigative action and therefore FHE notification.
 - Culling of fish must be reported to the Department as a FHE when used as a management tool to mitigate suspected or confirmed disease in a population.
 - Routine “grading out” of poor performers during any transfer is exempt from this reporting requirement.
- The current occurrence categories of “new, ongoing and relapsing,” in Appendix V-B Mortality by Category will be changed to “new, ongoing and *recurring*.” Please see the “Guidance” tab in the new FHE reporting template for definitions of these deliniations..
- Each disease process warrants an independent FHE report, and follow-up reporting as necessary.

- For example, if there were two disease processes being treated on farm (even if the treatment is one and the same) each disease must be reported independently. It is recommended that a reference be made to the concurrent disease in the “Comments” column.

2. Mortality Event (ME) reporting:

- All ME that are reported to the Department as per CoL 4.4(b)(i) and 4.4(b)(ii) must be reported using the new template that replaces the current Appendix V-A (Urgent Notification (& Follow-Up Reports)) of Mortality Events.
- All supporting documentation which justifies the primary and any contributing cause(s) of the ME must be retained on site and be made available to the Department upon request.
- Mortalities which occur during a transfer must be reported as occurring at the *destination* facility.
 - Rationale: This ensures that mortality is not “split” between source and destination facilities, or reported twice. By attributing mortalities to the destination facility, any subsequent mortalities which may be related to the transfer will be captured in subsequent ME reports.
- 10 day follow up ME reports are required for all MEs, unless it is stated in the initial notification that the ME cause has been resolved.
 - 10 day follow up mortality reports must include mortality broken down day-by-day for the 10 days, with any updates to primary probable cause, diagnosis, actions taken as appropriate.
 - If the ME has resolved within the 10 days, this must be indicated in the comments section of the report.
- The “Pens Affected” column in the new template is meant to capture mortality events which clearly only affect a portion of the farm (e.g. handling, predation, transfer). Any generalized environmentally induced MEs should be reported as “all pens.”
- Any accumulated mortalities, due to a delay in retrieval, must be reported on the day they are recovered from the pen(s) (i.e. not averaged out over the previous days)
 - Rationale: There is no way of knowing which mortalities occurred on which day(s) during the absent or incomplete mortality retrieval. Therefore, averaging out the mortalities over numerous days may result in a given mortality event being missed. Licence holders must make efforts to ensure that, “carcasses are collected, classified and recorded on a routine and frequent basis...” as per 2.6.1 of the HMP.

- If there are circumstances which result in the delayed retrieval of mortalities (e.g. weather, biosecurity, equipment malfunction) which then resulted in a mortality event trigger on the day of retrieval, provide this supporting evidence to the Department with your ME notification. The Department will not enter a record of a ME where sufficient evidence has been provided to justify the exemption of a ME.
3. Sea lice over threshold reporting:
- All Sea lice threshold exceedances that are reported to the Department as per CoL 7.3 must be reported using the new template.
 - Any exceedance that occurs outside of the juvenile salmon outmigration period and is reported to the Department as per CoL 7.1, must be reported again if the exceedance is still ongoing on or after March 1st.
 - As per CoL 6.4 and 6.5, plans to address sea lice threshold exceedances must be submitted to the Department within seven and 30 calendar days respectively, of the date of discovery.
 - Between March 1 and June 30th, plans must be *implemented* within 15 days
 - The “date of discovery” is synonymous with the “Incident Date” found in the new Sea Lice Overabundance Template (see “guidance” tab for definition).
 - As per Appendix VI 1.1(c), a three-pen sampling event must be conducted within five calendar days.

This bulletin is our interpretation of the licence conditions based on current information and updated reporting templates. Please be advised that this bulletin is subject to revision at the Department’s discretion and will be sent to licence holders if and when updated.

If you require further clarification please contact DFO aquaculture fish health veterinarian, Zac Waddington, by telephone at 250 703-0902 or by email at zac.waddington@dfo-mpo.gc.ca

Sincerely,

Adrienne Paylor
Manager, Aquaculture Environmental Operations
Fisheries and Oceans Canada

Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, January 21, 2019 2:49 PM
To: Waddington, Zac
Subject: New Fish Health Reporting Templates - BCSFA
Attachments: Draft Urgent Notifications Bulletin.pdf; Fish Health Event Template (V8.5).xls; Mortality Event Template (V8.4).xls; Sea Lice Overabundance Template (V8.2).xls

Hey Zac, you'll have to add your signature to this but otherwise I think it's good to go. Templates and draft Bulletin attached. I added a watermark to the bulletin and turned it into a PDF. [REDACTED] email, in case you don't have it, is [REDACTED]

Krista.

[REDACTED]

As I'm sure you are aware, we are working towards increasing the consistency and accuracy of industry reporting with regards to Fish Health. We have developed three new reporting templates for Fish Health Events, Mortality Events and Sea Lice Overabundance Notifications which have been already been shared with industry with a request for feedback. We received positive feedback from licence holders, and incorporated some improvements. These new templates are not intended to increase regulatory burden, and I hope that they will help to provide clarity on reporting expectations as well as modernize our data management systems.

Mortality Events – this template will replace the current Appendix V-A (Urgent Notification (& Follow-Up Reports) required by Conditions of Licence 4.4(b)(i) and 4.4(b)(ii). New information requested includes the pens affected (optional), daily inventory for the duration of the event, the average weight of affected fish, and a column to describe other contributing factors that may have resulted in mortality in addition to the primary probable cause.

Fish Health Events – This template will replace the current Appendix V-B (Mortality by Category) which is used to notify the Department of a Fish Health Event, as per Condition of Licence 4.5(c) and 4.5(d). This template provides structured drop down lists for diagnoses and mitigation as well as additional details pertaining to the size of the fish and the pens affected. We also provide additional clarity pertaining to the definitions of New, Ongoing and Relapsing events.

Sea Lice Overabundance Notification – this new template will be used to notify the Department when a the sea lice abundance at a facility exceeds the three motile threshold as per Condition of Licence 7.3. This template provides a structured drop down list for planned mitigation and requests the current inventory at the facility to allow us to calculate an estimate the absolute inventory of lice on the farm.

When these templates are released, they will be accompanied by a Bulletin (draft attached) that will clearly outline these expectations and clarify some elements of our current licence. However, since these templates will effectively become part of the Conditions of Licence, I am hoping to obtain support from the BC Salmon Farmer's Association to distribute and use these new reporting tools prior to the issuance of the new Conditions of Licence in 2022. I am happy to discuss these changes with you and answer any questions that you may have. Please call me at 250 703 0902 at your convenience.

s.19(1)

Thank you for your time,

Zac Waddington

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Santé de poisson
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 - Any exceedance that occurs outside of the juvenile salmon outmigration period and is reported to the Department as per CoL 7.1, must be reported again if the exceedance is still ongoing on or after March 1st.
 - As per CoL 6.4 and 6.5, plans to address sea lice threshold exceedances must be submitted to the Department within seven and 30 calendar days respectively, of the date of discovery.
 - Between March 1 and June 30th, plans must be *implemented* within 15 days
 - The “date of discovery” is synonymous with the “Incident Date” found in the new Sea Lice Overabundance Template (see “guidance” tab for definition).
 - As per Appendix VI 1.1(c), a three-pen sampling event must be conducted within five calendar days.

This bulletin is our interpretation of the licence conditions based on current information and updated reporting templates. Please be advised that this bulletin is subject to revision at the Department’s discretion and will be sent to licence holders if and when updated.

If you require further clarification please contact DFO aquaculture fish health veterinarian, Zac Waddington, by telephone at 250 703-0902 or by email at zac.waddington@dfo-mpo.gc.ca

Sincerely,

Adrienne Paylor
Manager, Aquaculture Environmental Operations
Fisheries and Oceans Canada

Report Code: MORTEVT
Version No.: 8.0
Build No.: 4

Instructions for using this Excel template:

- (1) Go to "Step 1 - General Info" worksheet.
- (2) Select Licence Holder Name from drop-down list
- (3) Then select "Facility Reference No" from drop-down list
- (4) Complete the remaining columns (if applicable)
- (5) Go to "Step 2 - Report Details" worksheet.
- (6) Enter data and complete the remaining columns (if applicable)
- (7) Explain in comments when "Other" is chosen from the pick list
- (8) Data can be copied and pasted into multiple subsequent rows. However, please note that data can not be copied to cells marked "do not enter".*

Color Meaning:

| | |
|--|--------------------------------|
| | Mandatory Field (Data Missing) |
| | Do Not Enter |
| | Enterable Field |

* N.B. in order to maintain data integrity, data from external sources should not be copied directly into greyed-out cells. Please input the data directly into this spreadsheet.

Last Updated: 11/14/2018

| <i>Licence Holder Name</i> | <i>Facility Reference No</i> | <i>Facility Name</i> | <i>Fish Health Zone</i> |
|---|--|----------------------|-----------------------------|
| <i>Pick Licence Holder (Start Here)</i> | <i>Pick Licence Holder BEFORE Select Facility Here</i> | <i>Do Not Enter</i> | <i>Do Not Enter</i> |
| | | | |

Report Code: FISHHEALTH
Version No.: 8.0
Build No.: 5

Instructions for using this Excel template:

- (1) Go to "Step 1 - General Info" worksheet.
- (2) Select Licence Holder Name from drop-down list
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Color Meaning:

| | |
|--|--------------------------------|
| | Mandatory Field (Data Missing) |
| | Do Not Enter |
| | Enterable Field |

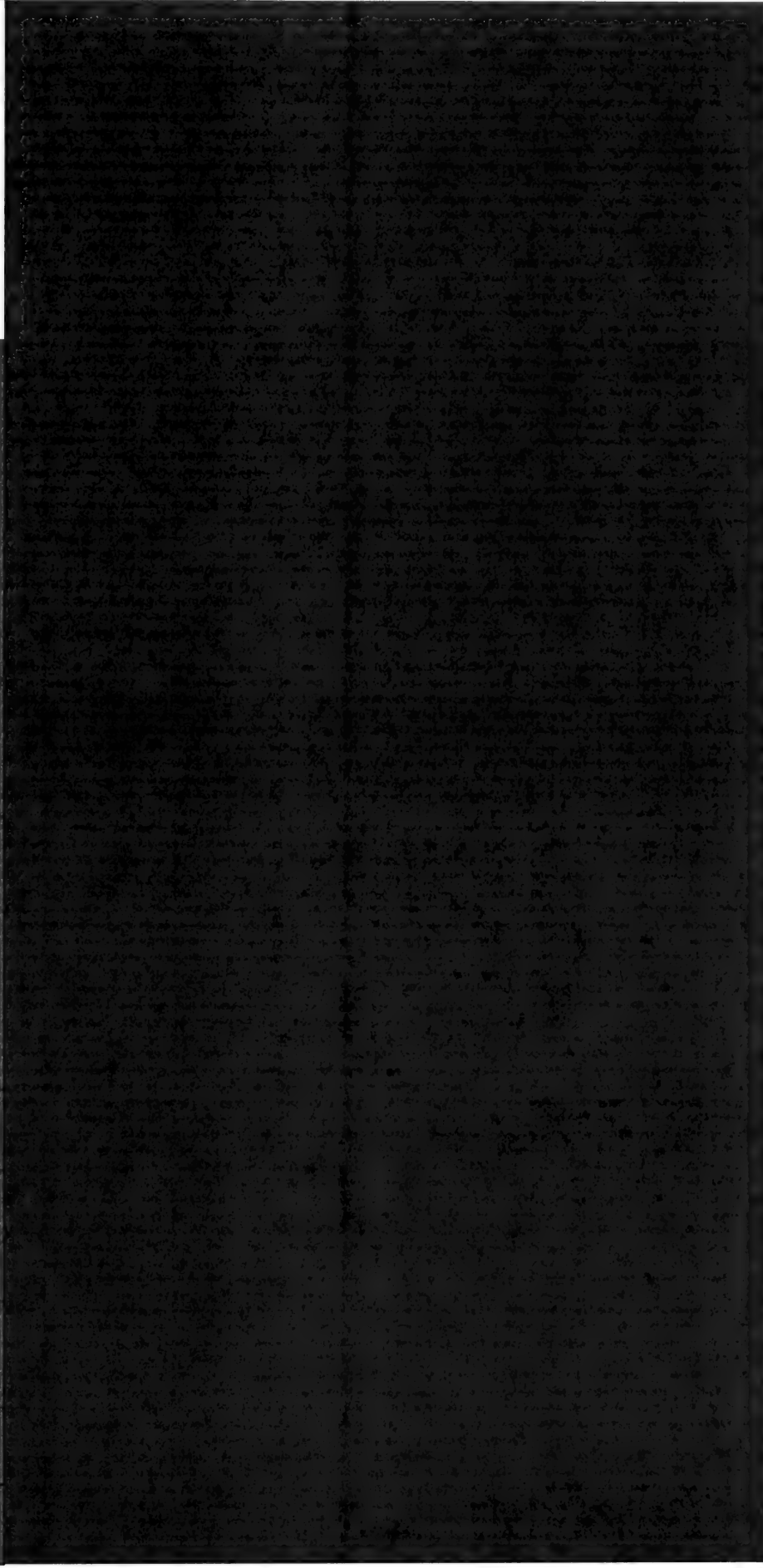
* N.B. in order to maintain data integrity, data from external sources should not be copied directly into grayed-out cells. Please input the data directly into this spreadsheet.

Last Updated:

11/14/2018

| <i>Licence Holder Name</i> | <i>Facility Reference No</i> | <i>Facility Name</i> | <i>Fish Health Zone</i> |
|---|--|----------------------|-------------------------|
| <i>Pick Licence Holder (Start Here)</i> | <i>Pick Licence Holder BEFORE Select Facility Here</i> | <i>Do Not Enter</i> | <i>Do Not Enter</i> |
| | | | |

| Incident Date | Associated Mortality Event? (Y/N) | Species Affected | Average Weight (grams) | Occurrence Category | Pens Affected | Veterinary Diagnosis | Mitigation Category | Mitigation Description | Comments |
|--------------------------|-----------------------------------|------------------|------------------------|---------------------|------------------------------------|---------------------------------|---------------------|------------------------|----------|
| Input format: YYYY-MM-DD | Pick List | Pick List | Input format: 999999 | Pick List | "All pens" or indicate pen numbers | Pick List (Explain in Comments) | Pick List | | |



Report Code: SEALICEOA
Version No.: 8.0
Build No.: 2

Instructions for using this Excel template:

- (1) Go to "Step 1 - General Info" worksheet.
- (2) Select Licence Holder Name from drop-down list
- (3) Then select "Facility Reference No" from drop-down list
- (4) Complete the remaining columns (if applicable)
- (5) Go to "Step 2 - Report Details" worksheet.
- (6) Enter data and complete the remaining columns (if applicable)
- (7) Explain in comments when "Other" is chosen from the pick list

Color Meaning:

| | |
|--|--------------------------------|
| | Mandatory Field (Data Missing) |
| | Do Not Enter |
| | Enterable Field |

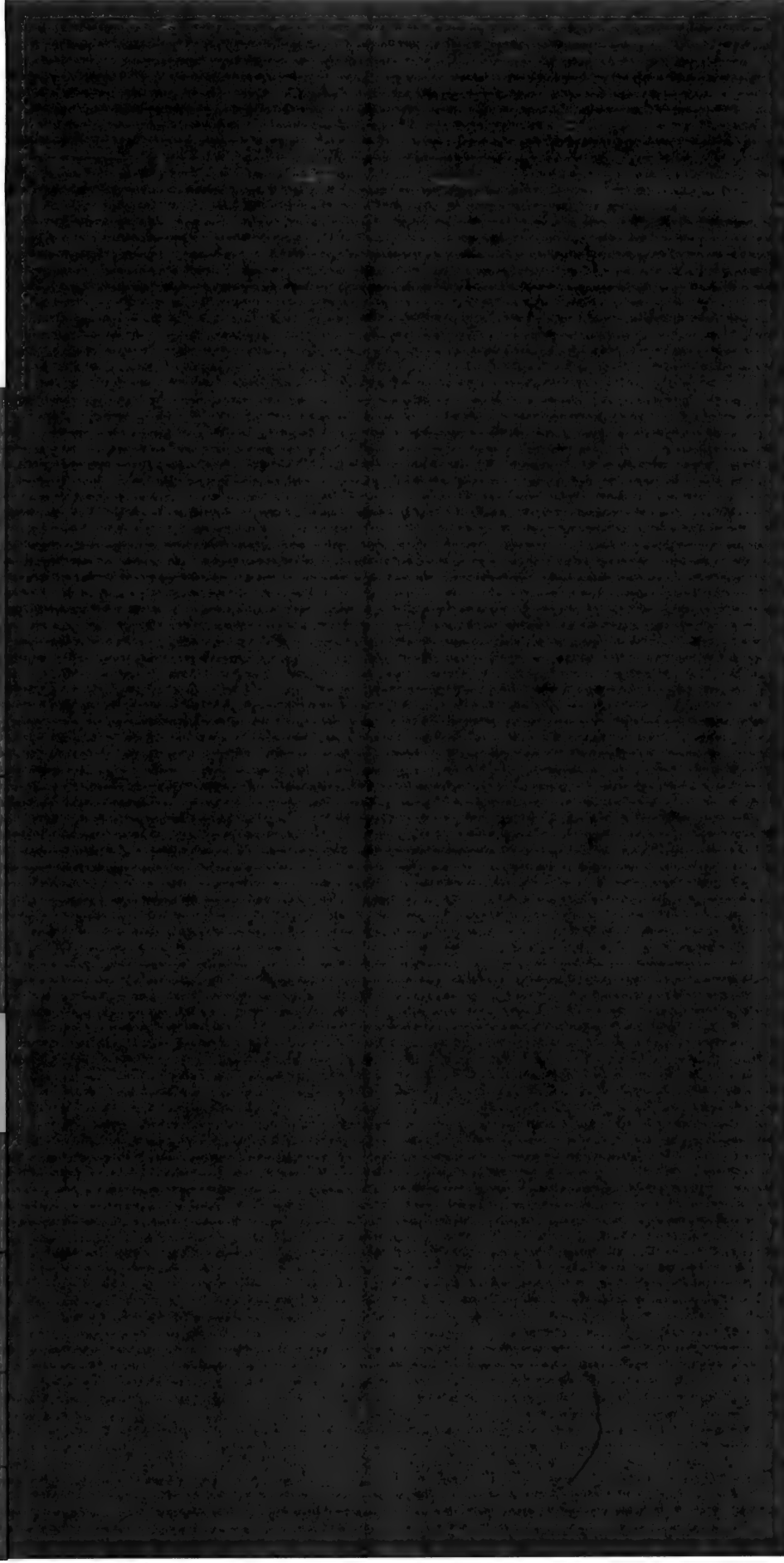
* N.B. in order to maintain data integrity, data from external sources should not be copied directly into greyed-out cells. Please input the data directly into this spreadsheet.

Last Updated:

8/31/2018

| <i>Licence Holder Name</i> | <i>Facility Reference No</i> | <i>Facility Name</i> | <i>Fish Health Zone</i> |
|---|--|----------------------|-------------------------|
| <i>Pick Licence Holder (Start Here)</i> | <i>Pick Licence Holder BEFORE Select Facility Here</i> | <i>Do Not Enter</i> | <i>Do Not Enter</i> |
| | | | |

| Incident Date Input format: YYYY-MM-DD | Outmigration Period? (Y/N) Pick List | Current Inventory Input format: 9999999 | Average Motile Lice Input format: 99.99 | Absolute Sea Lice Inventory Do Not Enter | Planned Mitigation Category Pick List | Mitigation Description Describe in detail the mitigation measures planned ie) type of treatment, planned start date, etc. | Comments |
|--|--|---|--|--|--|---|----------|
|--|--|---|--|--|--|---|----------|



Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, January 21, 2019 3:21 PM
To: Waddington, Zac
Subject: RE: New Fish Health Reporting Templates - BCSFA

No problem. Now let's hope that she responds quickly and doesn't have any objections! [REDACTED]

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire : [REDACTED]



Government
of Canada

Gouvernement
du Canada

Canada

From: Waddington, Zac
Sent: January-21-19 2:53 PM
To: Sandberg, Krista
Subject: RE: New Fish Health Reporting Templates - BCSFA

Thanks so much Krista!

s.16(2)(c)

s.19(1)

s.21(1)(b)

From: Sandberg, Krista
Sent: January-21-19 2:49 PM
To: Waddington, Zac
Subject: New Fish Health Reporting Templates - BCSFA

Hey Zac, you'll have to add your signature to this but otherwise I think it's good to go. Templates and draft Bulletin attached. I added a watermark to the bulletin and turned it into a PDF. [REDACTED] email, in case you don't have it, is [REDACTED]

Krista.

[REDACTED]

As I'm sure you are aware, we are working towards increasing the consistency and accuracy of industry reporting with regards to Fish Health. We have developed three new reporting templates for Fish Health Events, Mortality Events and Sea Lice Overabundance Notifications which have been already been shared with industry with a request for feedback. We received positive feedback from licence holders, and incorporated some improvements. These new templates are not intended to increase regulatory burden, and I hope that they will help to provide clarity on reporting expectations as well as modernize our data management systems.

Mortality Events – this template will replace the current Appendix V-A (Urgent Notification (& Follow-Up Reports) required by Conditions of Licence 4.4(b)(i) and 4.4(b)(ii). New information requested includes the pens affected (optional), daily inventory for the duration of the event, the average weight of affected fish, and a column to describe other contributing factors that may have resulted in mortality in addition to the primary probable cause.

Fish Health Events – This template will replace the current Appendix V-B (Mortality by Category) which is used to notify the Department of a Fish Health Event, as per Condition of Licence 4.5(c) and 4.5(d). This template provides structured drop down lists for diagnoses and mitigation as well as additional details pertaining to the size of the fish and the pens affected. We also provide additional clarity pertaining to the definitions of New, Ongoing and Relapsing events.

Sea Lice Overabundance Notification – this new template will be used to notify the Department when a the sea lice abundance at a facility exceeds the three motile threshold as per Condition of Licence 7.3. This template provides a structured drop down list for planned mitigation and requests the current inventory at the facility to allow us to calculate an estimate the absolute inventory of lice on the farm.

When these templates are released, they will be accompanied by a Bulletin (draft attached) that will clearly outline these expectations and clarify some elements of our current licence. However, since these templates will effectively become part of the Conditions of Licence, I am hoping to obtain support from the BC Salmon Farmer's Association to distribute and use these new reporting tools prior to the issuance of the new Conditions of Licence in 2022. I am happy to discuss these changes with you and answer any questions that you may have. Please call me at 250 703 0902 at your convenience.

Thank you for your time,

Zac Waddington

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Friday, February 1, 2019 10:21 AM
To: Waddington, Zac
Subject: Emailing: Sea Lice - Options to manage threshold exceedences 2017-05-17, SeaLice_purposeMay2017_
Attachments: Sea Lice - Options to manage threshold exceedences 2017-05-17.docx; SeaLice_purposeMay2017_.pptx

Did I ever send you the work we did two years ago on new sea lice COL? We should circle back with Bernie who coordinated this working group for us.

No information has been removed or severed from this page

AMENDING SEA LICE LICENCE CONDITIONS TO BETTER MANAGE SEA LICE THRESHOLD EXCEEDENCES

May 2017

The marine finfish aquaculture licence regulates sea lice at marine fish farms through the authority of the *Pacific Aquaculture Regulations*. The present licence conditions set a sea lice management threshold of three motile *Lepeophtheirus salmonis* (*Lep*) in order to minimize impacts on wild salmonids. However, there are no specific conditions outlining a maximum time period to be met to reduce the sea lice count and to what degree the absolute sea lice inventory must be reduced if the threshold cannot be met during the March 1 to June 30 time period when a majority of smolts migrate from their natal streams and are at the highest potential risk of being impacted by sea lice. There is also no condition requiring the licence holder to reduce sea lice levels back to the three motile *Lep* threshold.

At present there are few options available to the aquaculture industry to reduce the absolute sea lice inventory and those available can result in the potential for sea lice resistance (SLICE) or take a substantial period of time to implement and complete. Second year fish typically have a higher lice burden than first year fish and harvesting is more often the chosen option for these fish. Information from past events where harvesting was the chosen option to reduce absolute sea lice inventory indicate that, for a variety of reasons, harvesting took a significantly long period of time to implement and complete. As well, the amount of fish harvested [REDACTED] and although the “letter of the law” was followed the intent was not necessarily met. As a result harvesting may not effectively reduce the absolute sea lice inventory to the degree that the risk to migrating smolts is reduced.

The three motile *Lep* threshold has occasionally been exceeded during this time period over the past several years, however the level of exceedance was particularly high at a number of farms in 2015 and again in 2017 and the licence holder response in reducing the absolute sea lice inventory was, in the Department’s view, not reactive enough.

The focus of this document is to explore options to:

- a. impose specific time frames/actions whereby absolute sea lice numbers are significantly reduced in a short period of time if thresholds are exceeded during the March 1 to June 30 time period;
- b. add a licence condition requiring the three motile *Lep* threshold be met within a certain period of time if harvesting is not the chosen option;
- c. explore possibility of pushing back the heightened sea lice sampling period (March 1 – June 30) to January 1 with a requirement to have sea lice numbers below the three motile *Lep* threshold before March 1;

s.21(1)(a)

s.21(1)(b)

- d. review monitoring requirements in the July 1 - December 31 period when sea lice abundance increases due to migration of adult salmon;
- e. Combination of (c) and (d).

The specific licence conditions that relate to this issue and that may have to be amended are as follows:

- 6.4 Starting March 1, 2017, the licence holder must conduct annual sampling between March 1 and June 30 for the term set out in this licence. The licence holder cultivating Atlantic salmon and trout must carry out a sea lice abundance assessment every two weeks, at minimum, for fish held in containment structures for more than 30 calendar days. Where data collected in Appendix VI-A indicates the sea lice abundance threshold of three motile *Lepeophtheirus salmonis* has been exceeded, the licence holder must:
 - (a) within 15 calendar days of the discovery, implement a plan which will reduce the absolute sea lice inventory within the containment structure array; and
 - (b) notify the Department as per section 7.1 and 7.3.

and

- 6.5 Starting July 1, 2016, the licence holder must conduct sampling annually between July 1 and February 28 for the term set out in this licence. The licence holder cultivating Atlantic salmon and trout must carry out a sea lice abundance assessment once every month for fish held in containment structures for more than 30 calendar days. Where data collected in Appendix VI-A indicates the sea lice abundance threshold of three motile *Lepeophtheirus salmonis* has been exceeded, the licence holder must:
 - (a) increase monitoring to at least once every two weeks;
 - (b) within 30 calendar days of the first discovery, provide a plan to address the exceedance to the Department, for its considered response; andnotify the Department as per section 7.1.

There are a limited number of potential avenues to **impose** conditions on the marine aquaculture industry to better manage sea lice such that thresholds are below the three motile *Lep* threshold prior to March 1 and to reduce the absolute sea lice inventory in a more timely and responsive manner when they are exceeded:

1. Changing Licence Conditions – Marine finfish aquaculture licences were issued on June 30, 2016 for a six year period with the exception of those farms in the Discovery Islands which continue to have one year licences. Licence conditions can only be changed if the licence holder applies for an amendment, the licence expires or for conservation reasons if the Department concludes that **the aquaculture industry is impacting a fishery(s)**. The only other option would be for the Department to convince licence holder to request their

licences be amended to reflect stricter conditions to manage sea lice. There are two aspects of conservation that need to be considered. One is the protection of wild salmonids on a population basis and the second is the protection of cultured fish which by legal definition is considered a fishery. Clarification will be required on what constitutes a population with regard to cultured salmon.

Pro:

- Licence conditions are enforceable;
- Support by the public;
- The possibility of litigation by ENGOs or First Nations reacting to high sea lice numbers may be reduced;

Con:

- DFO Science has indicated there is no direct correlation between increased sea lice numbers on cultured salmon and smolt mortality. As such, changes to licence conditions for conservation reasons are not likely to be successful or supported;

2. Bulletin – The present license conditions 6.4 and 6.5 do not outline specific actions or time frames if the three motile *Lep* threshold is exceeded. A bulletin is a “soft” approach that has been used by AMD to more clearly define licence conditions when they are potentially vague or when there are exceptions. It is voluntary in nature as the licence holder cannot be forced to follow the direction in the bulletin as it is not a legal document. This could be considered a short term solution until the licence conditions can be amended or there are changes to the *Fisheries Act* and/or *Pacific Aquaculture Regulation*.

Pro:

- Easy to implement over a short period of time;

Con:

- A bulletin is not enforceable and has recently been used to further explain an existing licence condition rather than imposing a new condition(s);
- Industry unlikely to agree to some of the changes being proposed;

3. Change to *Fisheries Act* (FA) or *Pacific Aquaculture Regulation* (PAR) - Amendment to the FA or PAR to give the Department authority to make changes to licence conditions to better manage sea lice.

Pro:

- Legal authority to change licence conditions;

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- Support by the public;
- The possibility of litigation by ENGOs or First Nations reacting to high sea lice numbers may be reduced;

Con:

- It is difficult and will likely take several years to have changes made to the FA. Changes to the PAR may be easier to implement but will still take a significant length of time.

4. Direct order from Minister of Fisheries and Oceans for conservation reasons

Pro:

Con:

5. Licence conditions amended for farms located in the Discovery Islands as only one year licences are issued in this area. Due to complexity of issue target changes to licence for the December 2018 renewal;

Pro: Long term strategy to amend all licences using a phased approach

Con: Changing only licence conditions for farms within the Discovery Islands may trigger a judicial review as ENGOs or First Nations may have the position that all farms need the same regulatory requirements

As noted above there are several options to consider with regard to increasing the Department's ability to manage sea lice. Two options relate to the inclusion of specific time frames/actions whereby absolute sea lice numbers are significantly reduced in a short period of time if thresholds are exceeded during the March 1 to June 30 time period. One relates to the use of harvesting to reduce the absolute sea lice inventory and the other relates to the addition of a licence condition that requires sea lice number to be reduced to below the three motile *Lep* threshold if a treatment option other than harvesting is chosen.

With regard to harvesting several factors need to be considered in developing a condition that will ensure a significant reduction in the risk to migrating smolts. These would include the size of the farm (number of fish on site), year class, degree of infestation (sea lice count), number of fish harvested (% of stock on site), maximum length of time of the harvest and sea lice resistance to SLICE or other chemical treatments. A matrix could be built to reflect these factors. For example the degree of infestation, an average of 10 sea lice vs an average of 50 sea lice could be managed differently as could a farm with a maximum combined biomass of 2500t vs a farm with 3500t. The latter farm will have a much greater absolute sea lice number. First year fish often carry less sea lice as they are smaller. These factors should drive the degree of harvesting and

possibly the maximum length of time for harvesting to be completed. It is important to note that a licence holder has 15 days to implement an action plan if above the threshold and considering a minimum two week period for harvesting to occur will result in high sea lice counts for an entire month.

At present there is no licence condition that requires the licence holder to reduce the average sea lice numbers below the threshold of three motile *Lep* if other treatment options are chosen. This requirement would align with other performance management measures in the marine finfish licence such as that for exceeding benthic thresholds. This would also reduce the absolute sea lice numbers to a level that aligns with the three motile *Lep* threshold.

In order to reduce the risk of impacting wild salmon smolts another option would be to move the March 1 implementation date for enhanced monitoring outlined in condition 6.4 back to February 1 or even January 1. The increased sampling frequency would give the licence holder more time to react to and reduce high sea lice numbers prior to the smolt outmigration window starting in early March.

A final option for review and potential change is the sea lice sampling and monitoring program associated with the July 1 to February 28 (see discussion above to push back this date) period. A fundamental question is does a sea lice load of 50 motile *Lep* in October have a different level of risk than if it occurred in January or during the March 1 – June 30 period? What are these risks and how would they be managed? Is one option to hold off on the use of any treatment, but especially SLICE, until early in the calendar year in order to ensure the threshold of three motile *Lep* is met by March 1?

WHAT'S THE CHANCE OF LITIGATION IF DFO DOES NOT DO SOMETHING?

IS THIS A COMMON PROBLEM OR JUST A ONE-OFF?

Other questions not directly related to changing licence conditions:

Evidence of resistance? Change treatment approach asap. Provincial role in treatment options. Are alternate treatment options best used during certain times of the year to reduce risk? What about during the smolt migration?

Support of alternate treatment methods such as cleaner fish and high pressure washing?

Different treatments may have different requirements in their use.

What happens if a company goes bankrupt and can't get rid of the fish?

RISK FACTORS TO CONSIDER IN CALCULATING SEVERITY OF POTENTIAL IMPACT TO WILD FISH

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Sea Lice Management

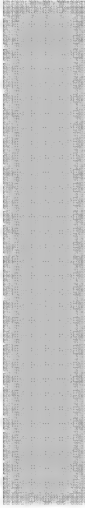
Considerations to Guide Potential Changes

June 2017

Overview

1. WHY? Rationale for changes
2. PURPOSE? Expected outcomes and goals
3. WHAT to change? Areas where changes could be applied

Outside of Scope:

4. Detailed OPTIONS for changes - SMEs required
5. MECHANISMS for changes – 

WHY?

Rationale for change(s)

- Inability of Department to regulate the management of sea lice which may potentially result in negative impacts to:
 - a) **Wild fish and fisheries**
 - b) **Farmed fisheries**

Slide 3

D1 DFO-MPO, 6/15/2017

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WHY?

Rationale for change(s)

- Potential negative impacts to:
 - a) **Wild fish and fisheries**
 - Serious fish health issues may occur when salmon are heavily infected by sea lice (DFO 2014)
 - Farms are considered to be potential reservoirs of sea lice which may be transmitted to wild fish. Transmission has the potential to negatively impact juvenile salmon during their outmigration. As such, control of sea lice on salmon farms is important (DFO 2014). [D3]
 - Several recent [D5] studies have reached contradictory conclusions on whether the spread of lice from salmon farms affects the productivity of sympatric wild salmon populations [D4] kosek *et al.* 2011)
 - Marty *et al.* (2010) focused on a pink salmon stock complex and concluded that salmon farms do not affect the productivity of wild salmon
 - Krkosek *et al.* (2011) found that sea lice abundance on farms is negatively associated with productivity of both pink and coho salmon in the Broughton Archipelago, consistent with Connors *et al.* (2010) and Krkosek & Hilborn (2011)

Precautionary approach: aim to prevent potential negative impacts to wild fish from farms even though published literature is mixed

Slide 4

D3 I am not sure this last sentence is necessary.

DFO-MPO, 6/15/2017

D4 Can we say this without referencing Krkosek by changing the text slightly? We know this through our own review of studies through 2017.

DFO-MPO, 6/15/2017

D5 I would remove the word "recent" as 2011 is not that recent considering other studies have been done more recently.

DFO-MPO, 6/15/2017

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WHY?

Rationale for change(s)

- Potential Negative impacts to:
 - b) Farmed fisheries (DFO 2014)**
 - Sea lice can be a serious threat to the health and welfare of farmed salmon when heavily infected by sea lice
 - Serious fish health issues can occur when salmon are heavily infected by sea lice D6
 - Disease impacts resulting from sea lice infestations are mainly known to occur on salmon farms when infestation rates are extremely high
 - Sea lice abundance on farms is positively correlated with density of farms in a given area D7

Slide 5

D6 Delete this bullet as same concept as the amended bullet above.

DFO-MPO, 6/15/2017

D7 This last bullet seems like extra information but is not fundamental to the point being made. Is there another place where this could go?

DFO-MPO, 6/15/2017

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PURPOSE?

Management Principles:

- Increased enforceability (if licence condition is not considered to be substantially met)
 - Outcome based
 - Not tool specific
- Flexibility to use expertise
to meet goal

Goal: Lice under threshold level

PURPOSE?

Goal: Sea Lice under threshold level

- Considerations:
- Duration of time over threshold
 - links to monitoring and treatment/detection response timing
 - Wild salmon out-migration timing window



WHAT to change?

A) Monitoring

- No change to current monitoring

(In Season)

- Change current monitoring:

- In Season
- In Season and Pre Season
- In Season, Pre Season, and Off Season
- All Year without seasonal differences →

If 1. rationale includes links to wild fish/fisheries

If 1. rationale links to farmed fisheries

WHAT to change?

B) Over Threshold Response

– No change to current response required (In Season)

– Change response required:

- In Season
- In Season and Pre Season
- In Season, Pre Season, and Off Season
- All Year without seasonal differences →

If 1. rationale includes links to wild fish/fisheries

If 1. rationale links to farmed fisheries

WHAT to change?

C) Both Monitoring and Over Threshold Response

-Various permutations to be considered

Outside of Scope

4. Detailed OPTIONS for changes - SMEs
required

5. MECHANISMS for changes –



s.23

Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, February 1, 2019 10:29 AM
To: Paylor, Adrienne; Waddington, Zac; McConnachie, Sarah
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart
Attachments: MECTS-#4015066-v2-
Comparison_of_sea_lice_regulations_in_Atlantic_salmon_-_Canada_submission.DOC

FYI. I provided comments to the Pacific Region section

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Paznar, Nadija
Sent: February-01-19 7:03 AM
To: Cline, Gerald (Jeff); Hendry, Christopher; Parsons, Dave; Lanteigne, Stephen; LeBlanc, Carole L; Albert, Florence
Cc: Laking, Erin; Sandberg, Krista; Patirana, Anoma; Green, Barry
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Hi Jeff,

Thanks very much for your comments. As you'll see in the attached revised chart, I've added 'management measures' to the first bullet to reflect your comment below. I also moved the bullets that reflect the AAR, PMRA, FDA, VDD under the first bullet as it would apply to all of Canada, as I understand it. Make sense?

Copying others so that they are aware that this info is reflected and can work from this copy as they wish.

Carole/Florence – if you could have a look at this chart in Stephen's absence that would be appreciated.

Thanks again,

Nadija Paznar

From: Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>
Sent: Thursday, January 31, 2019 9:59 AM
To: Paznar, Nadija <Nadija.Paznar@dfo-mpo.gc.ca>; Cline, Gerald (Jeff) <Gerald.Cline@dfo-mpo.gc.ca>
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart

Hi Nadija,

Please see comments below from Jeff Cline – who is most familiar with sea lice management for Maritimes.

Cheers,
Erin

s.16(2)(c)

From: Cline, Gerald (Jeff) <Gerald.Cline@dfo-mpo.gc.ca>
Sent: Thursday, January 31, 2019 9:44 AM
To: Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>; Rose-Quinn, Tammy <Tammy.Rose-Quinn@dfo-mpo.gc.ca>
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Hi, attached, generally I would rebrand this, what is listed are not regulations per say they are management measures that are supported by acts and regulations i.e. licence conditions, NB is the only jurisdiction that the actions are clearly written within the aqua regs. Regulations / Management Measures would be more appropriate.

J

From: Paznar, Nadija <Nadija.Paznar@dfo-mpo.gc.ca>
Sent: Wednesday, January 30, 2019 2:11 PM
To: Hendry, Christopher <Christopher.Hendry@dfo-mpo.gc.ca>; Parsons, Dave <Dave.Parsons@dfo-mpo.gc.ca>; Albert, Florence <Florence.Albert@dfo-mpo.gc.ca>; Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>; Rose-Quinn, Tammy <Tammy.Rose-Quinn@dfo-mpo.gc.ca>; Lanteigne, Stephen <Stephen.Lanteigne@dfo-mpo.gc.ca>
Subject: For review: Salmon farming countries sea lice regs comparison chart

Dear colleagues,

First off, I'd like to introduce myself - I'm new to DFO and the aquaculture group since October coming from Global Affairs Canada. I work on the quadrilateral salmon aquaculture file with Barry and Alistair and require your assistance. Our Scottish counterparts have developed, in the context of work that they're doing on looking at interactions between wild and farmed salmon, a comparison chart on sea lice regulations for Atlantic salmon that they would like to publish online.

Grateful if you could review what I've drafted under the Atlantic Coast section in the attached from online DFO sources to ensure I've accurately summarized the regulations in your regions. Your input by Friday COB would be appreciated.

Thanks very much and please let me know if you have any questions.

Nadija Paznar
Senior Fisheries and Aquaculture Management Officer
Fisheries and Oceans Canada / Ministère des Pêches et Océans
Aquaculture Management / La gestion de l'aquaculture
200 Kent Street / 200, rue Kent
Ottawa, Ontario K1A 0E6
Telephone/Téléphone: [REDACTED]

s.16(2)(c)

Summary of Sea Lice Regulations / Management Measures in Salmon Producing Countries – January 2019

| | SCOTLAND | NORWAY | CANADA | CHILE | ICELAND |
|--|--|--|---|---|---|
| Comparison of Regulations / Management Measures | <ul style="list-style-type: none"> All farms must have measures in place to control sea lice and carry out coordinated area treatments. Records must be held for inspection by MSS FHI. Industry report to FHI at 3 and 8 average adult female lice per fish. Exceeding 8.0 average female lice per fish requires a reduction in lice numbers or sites face enforcement action Majority of industry also work to Code of Good Practice suggested criteria for treatment level of 0.5 avg. female fish | <ul style="list-style-type: none"> All fish farmers are required to count and report the number of lice, treat fish and maintain a coordinated programme (with other fish farmers in the area) to prevent and control louse infestation. Figures are reported monthly to the Norwegian authorities. Traffic light system in operation. Regulation sets a maximum prevalence of 0.2 avg. female lice per fish. Capacity increases permitted in regions where sea lice levels remain low. Capacity decreased in areas where sea lice control is deemed inadequate. | <ul style="list-style-type: none"> Regulatory and management measures aimed at controlling sea lice levels on salmon farms are set by Fisheries and Oceans Canada (DFO) in British Columbia (BC) and by coastal provincial governments elsewhere. Aquaculture Activity Regulations authorizes/monitors deposits from aquaculture operations under section 36 of the Fisheries Act. Health Canada is responsible for federal regulation of both veterinary drugs under the Food and Drugs Act (FDA) and pest control products (pesticides) under the Pest Control Products Act (PCPA). The Pest Management Regulatory Agency (PMRA) is responsible for the regulation of pesticides (topical sea lice treatment options). Veterinary Drugs Directorate (VDD) is responsible for the regulation of veterinary drugs. Under the Food and Drugs Act and Regulations. | <ul style="list-style-type: none"> Farms count caligus from 1 random cage and the index cage every 15 days. Farms operate in defined geographical districts Any farm which exhibits a parasitic load of 9 Caligus per adult fish in three weekly samples over 6 consecutive weeks will be subject to early harvest | <ul style="list-style-type: none"> The fish disease authority has published a guideline encouraging sea-cage farms to count and report the number of lice on a regular basis (this requirement will be implemented in Icelandic regulation during spring 2019). Figures are reported to the Icelandic authorities when requested. No special limit for max. prevalence of female lice per fish. Fish farms must apply to a special Fish Health Committee for every single treatment, where all aspects must be considered. Surveillance and treatment (timing and product used) will vary depending on lice species, climate, water parameters and available therapeutants. |

Pacific Coast (BC)

Summary of Sea Lice Regulations / Management Measures in Salmon Producing Countries – January 2019

| | | | | |
|--|--|--|--|--|
| | | | <ul style="list-style-type: none">• DFO requirements ensure that sea lice numbers are lowest during the outmigration period, when wild juvenile salmon are at greatest risk.• Operators record and report to DFO the abundance of sea lice at conventional marine net-pen farms. DFO conducts audits to verify the accuracy of industry protocols and reporting; 50% of farms are audited during the outmigration period.• Sampling for sea lice is required monthly from July to February, and every two weeks from March 1 to June 30 during wild salmon outmigration. A "sampling event" consists of three pens of 20 fish/pen. The farm-level sea lice abundance is the average of these three pens.• Management action is required when the regulatory threshold of three motile L. salmonis per fish is exceeded.• During the outmigration period, operators must advise DFO within 7 days | |
|--|--|--|--|--|

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Summary of Sea Lice Regulations / Management Measures in Salmon Producing Countries – January 2019

| | | | | |
|--|--|--|---|--|
| | | | <p>when the threshold is exceeded. A plan for reduction of the absolute number of sea lice on the farm must be implemented within 15 days. Measures may include harvesting farmed salmon, use of in-feed medication, topical bath treatments or mechanical removal.</p> <ul style="list-style-type: none"> From July to February, abundances are reported on a monthly basis. A plan for reduction must be submitted to DFO within 30 days when the threshold is exceeded. <p><u>Atlantic Coast (New Brunswick, Nova Scotia, Newfoundland)</u></p> <p><u>New Brunswick</u></p> <ul style="list-style-type: none"> Operators must submit an annual sea lice management and treatment plan. <p>Weekly reporting of whether or not a sea lice treatment is planned and details of the treatment if planned.</p> <ul style="list-style-type: none"> Operators must perform weekly sea lice counts (of at least 6 cages consisting of at least 5 fish per cage) if the water is $\geq 5^{\circ}\text{C}$; and monthly if the water is $< 5^{\circ}\text{C}$. | |
|--|--|--|---|--|

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Summary of Sea Lice Regulations / Management Measures in Salmon Producing Countries – January 2019

| | | | | |
|--|--|--|---|--|
| | | | <p>°C. Operators must report within 48 hours after sea lice counts.</p> <ul style="list-style-type: none"> • Prior to sea lice treatments operators must perform a sea lice count from a sample of at least 6 cages consisting of at least 5 fish per cage; within 7 days before a treatment; following a treatment; • Aquaculture pesticide permit is issued in accordance with the Pesticides Control Act and Regulation by NB Environment and Local Government <p>Nova Scotia</p> <ul style="list-style-type: none"> • Operators must have a Farm Management Plan, including a fish health section with procedures for sea lice management. Operators must keep records that verify adherence to plan and demonstrate effective action was taken at critical points. Marine finfish operators must submit an updated fish health section for approval once a year. • Mandatory reporting of products to treat sea lice, | |
|--|--|--|---|--|

No information has been removed or severed from this page

Summary of Sea Lice Regulations / Management Measures in Salmon Producing Countries – January 2019

| | | | | | |
|--|--|--|---|--|--|
| | | | <p>as directed.</p> <p>Newfoundland</p> <ul style="list-style-type: none">• Operator must report pathogenic outbreaks immediately and take measures as directed.• A valid Pesticide Applicator License, Sea Lice Control in Salmon Aquaculture, is required to apply authorized pesticides. | | |
|--|--|--|---|--|--|

Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, February 8, 2019 11:25 AM
To: Waddington, Zac
Subject: RE: New Fish Health Reporting Templates - BCSFA

Hey Zac, I need to you scan this one again – it's missing page 2.

Thanks!

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
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From: Waddington, Zac
Sent: February-08-19 10:51 AM
To: Sandberg, Krista
Subject: RE: New Fish Health Reporting Templates - BCSFA

I'm just heading into a meeting with Bernie, but please see the attached Bulletin signed by Adrienne. I'll give you a shout ASAP to chat quickly,

Zac

From: Sandberg, Krista
Sent: February-08-19 9:12 AM
To: Waddington, Zac
Subject: RE: New Fish Health Reporting Templates - BCSFA

Excellent! It is possible that we could send this out today – give me a call when you get in and we can chat ☺

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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From: Waddington, Zac
Sent: February-07-19 2:49 PM
To: Ruth Salmon
Cc: Sandberg, Krista
Subject: RE: New Fish Health Reporting Templates - BCSFA

Thanks so much for reaching out to the industry and getting that feedback for us. I will touch base with [REDACTED] directly to address his comment below. We will be issuing the bulletin with the new templates very shortly.

s.16(2)(c)

s.19(1)

Zac

From: [REDACTED]
Sent: February-07-19 6:07 AM
To: Waddington, Zac
Subject: FW: New Fish Health Reporting Templates - BCSFA

Hi Zac,

All the companies are just fine with using the forms now. The only comment I received, that you may want to consider, was from [REDACTED] See below.

Feel free to say that you have support from the BCSFA to distribute and use these new reporting tools prior to the issuance of the new Conditions of Licence in 2022.

Thanks for reaching out,

Regards,

[REDACTED]

From: [REDACTED]
Date: Wednesday, February 6, 2019 at 11:29 AM
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: New Fish Health Reporting Templates - BCSFA

Good morning [REDACTED]

[REDACTED]
The one issue I have is with the sea lice reporting template

Column "E" automatically calculates the number of sea lice on a farm based on the average motile lice and the fish inventory. I understand that this may be a "close to" or approximation, but don't believe it is an "Absolute Sea Lice Inventory" ...just looking for correctness

| E |
|------------------------------------|
| Absolute Sea Lice Inventory |
| Do Not Enter |

s.19(1)

Best regards

[REDACTED]

[REDACTED]

MOWI CANADA WEST

OFFICE: (250) 850 – 3276 ext [REDACTED]

MOBILE: [REDACTED]

MAIL: [REDACTED]

OFFICE: 124-1334 Island Hwy
Campbell River, BC V9W 8C9
Canada

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s.19(1)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, February 8, 2019 11:38 AM
To: Waddington, Zac
Subject: RE: New Fish Health Reporting Templates - BCSFA

Hey, I also need the original word version of this template so that I can send it for translation and web posting. Can you send that to me as well or tell me where it is saved? Thanks!

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
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Zac

s.16(2)(c)

s.19(1)

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Thanks for reaching out,

Regards,

From: [REDACTED]
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To: [REDACTED]
Cc: [REDACTED]
Subject: RE: New Fish Health Reporting Templates - BCSFA

Good morning [REDACTED]

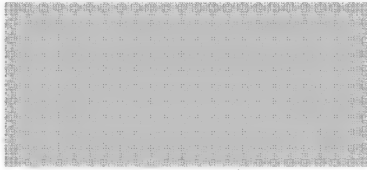
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| E |
|------------------------------------|
| Absolute Sea Lice Inventory |
| Do Not Enter |

s.19(1)

Best regards



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MOBILE:

MAIL:



OFFICE: 124-1334 Island Hwy
Campbell River, BC V9W 8C9
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s.19(1)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, February 11, 2019 8:15 AM
To: Waddington, Zac; McConnachie, Sarah
Subject: RE: Mortality event web text

Yes, I think so. We need Adrienne's approval then I will send it up through Michelle Rainer. She may have a few edits, usually just grammatical or language type things. If there is anything major I will get you to look at it again. Thanks a bunch!

Krista.

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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From: Waddington, Zac
Sent: February-09-19 1:52 PM
To: Sandberg, Krista; McConnachie, Sarah
Subject: RE: Mortality event web text

Totes agree. We can omit that sentence, then would it be acceptable?

Zac

From: Sandberg, Krista
Sent: February-08-19 3:42 PM
To: McConnachie, Sarah
Cc: Waddington, Zac
Subject: RE: Mortality event web text

I think I agree, Sarah. Zac, would you be ok with removing that sentence?

I think we also need to remember that this paragraph is meant to introduce the report and say why we have it and what information readers can gain from it. We don't typically include any interpretation of the data as the data could change at any time and the website should be timeless. If we had major disease outbreaks or a sea lice apocalypse then the website would be incorrect...

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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From: McConnachie, Sarah
Sent: February-08-19 3:38 PM

s.16(2)(c)

To: Sandberg, Krista
Cc: Waddington, Zac
Subject: RE: Mortality event web text

Is it necessary here to highlight that most mortality events are not disease-induced? Poor gill health is technically a disease, that may have infectious components, but happen to often cause environmental-related death. I feel like it is brushing off concerns in a way that may not be clearly justifiable if pushed. So why add it at all?

From: Sandberg, Krista
Sent: February-08-19 11:00 AM
To: McConnachie, Sarah
Cc: Waddington, Zac
Subject: RE: Mortality event web text

Ok, How does this look?

This report provides a summary of mortality events reported by aquaculture companies to Fisheries and Oceans Canada (DFO). Mortality at salmon aquaculture facilities is closely monitored. A mortality event occurs when a threshold of reduced biomass (kg) or percent inventory (kg) at a facility is exceeded. As a condition of licence, company veterinarians must determine the probable cause or diagnosis of the event and develop a plan to mitigate ongoing harm to the farmed fish and reduce risk to wild fish. Companies must notify DFO of the event within ten days, including details on the degree of mortality and mitigative actions performed and/or planned (monitoring, treatment or environmental mitigation). Companies must then implement the plan and continue to report mortalities and actions taken to DFO until the event is resolved. The vast majority of mortality events in BC are a result of poor environmental conditions and are not disease induced.

Historical data are available from 2011 to the present. The terminology used in the report's column headings is defined in the terminology file below. A glossary of the probable cause(s) of the mortality event and actions taken in response to the mortality event are explained and defined in the glossary file below.

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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From: McConnachie, Sarah
Sent: February-08-19 10:06 AM
To: Sandberg, Krista
Cc: Waddington, Zac
Subject: RE: Mortality event web text

s.16(2)(c)

The only edit I could think of:

Mortality events at BC marine finfish aquaculture sites

This report provides a summary of mortality events reported by aquaculture companies to Fisheries and Oceans Canada (DFO). A mortality event occurs when a threshold of reduced biomass or inventory at a facility is exceeded. As a condition of licence, companies must determine the probable cause of the event and notify DFO within ten days. They must provide details on the degree of mortality (biomass amount [kg] and percent [kg] of total population loss) and

mitigative actions performed and/or planned (monitoring, treatment or environmental mitigation). Companies must continue to report mortalities and mitigation to DFO until the event is over.

Historical data are available from 2011 to the present. The terminology used in the report's column headings is defined in the terminology file below.

From: Sandberg, Krista
Sent: February-05-19 10:59 AM
To: Waddington, Zac; McConnachie, Sarah
Subject: Mortality event web text

Hi Zac and Sarah – please see link below to draft mortality event web text to accompany the new open data report. Please review/edit/approve.

[\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\5. Fish Health and Mortality Events\2. Mortality Events\Mortality events at BC marine finfish aquaculture sites.docx](#)

Thanks,
Krista.

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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s.16(2)(c)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, February 11, 2019 9:27 AM
To: Paylor, Adrienne
Subject: RE: Mortality event web text

Zac and Sarah didn't comment on that, but I did try to think of other ways that we could word that sentence. The problem is that there are a couple different thresholds – 24hr and 5 day so we can't put exact numbers to the XX without making it overly complicated. Also, the percent inventory is actually a percent biomass still – not number of fish which further complicates it. Maybe we need to simplify even more –

"A mortality event occurs when the number of dead fish at a farm exceeds thresholds outlined in conditions of licence"

I didn't want to say "dying" because the fish must be already dead – we don't want to imply that an event occurs if fish are gasping for breath. Do you have any concerns with using the word "dead" – it sounds a bit harsh?

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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From: Paylor, Adrienne
Sent: February-11-19 8:42 AM
To: Sandberg, Krista
Subject: RE: Mortality event web text

I approved but it would be nice if we could use plain language to explain the threshold.....instead of: A mortality event occurs when a threshold of reduced biomass (kg) or percent inventory (kg) at a facility is exceeded.....maybe we could say: A mortality event occurs when the number of fish at a farm dying causes a reduction in biomass of XX or a loss of XX percent inventory.....anyway whatever you think as I'm sure everyone has weighed in on this by now ☺
Thx Adrienne

From: Sandberg, Krista
Sent: February-11-19 8:23 AM
To: Paylor, Adrienne
Subject: FW: Mortality event web text

Hi Adrienne,

Can you please review and approve the new web text for mortality events: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\5. Fish Health and Mortality Events\2. Mortality Events\Mortality events - web text.docx

Thank you!

Krista Sandberg

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Subject: RE: Mortality event web text

Totes agree. We can omit that sentence, then would it be acceptable?

Zac

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Public Reporting Manager | Gestionnaire de rapports publics
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s.16(2)(c)

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From: McConnachie, Sarah
Sent: February-08-19 10:06 AM
To: Sandberg, Krista
Cc: Waddington, Zac
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Mortality events at BC marine finfish aquaculture sites

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s.16(2)(c)

\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\5. Fish Health and Mortality Events\2. Mortality
Events\Mortality events at BC marine finfish aquaculture sites.docx

Thanks,
Krista.

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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Fisheries and Oceans Canada | Pêches et Océans Canada
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s.16(2)(c)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Tuesday, February 12, 2019 9:40 AM
To: Waddington, Zac
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Would you like, or would you like me to communicate this back to Nadija?

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
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From: Waddington, Zac
Sent: February-10-19 3:07 PM
To: Sandberg, Krista; Paylor, Adrienne; McConnachie, Sarah
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

My only question would be around the 0.2 female lice threshold for Norway. I was under the impression it was 0.2 gravid female lice which would be a substantial difference.

Zac

From: Sandberg, Krista
Sent: February-01-19 10:29 AM
To: Paylor, Adrienne; Waddington, Zac; McConnachie, Sarah
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart

s.16(2)(c)

FYI. I provided comments to the Pacific Region section

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
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From: Paznar, Nadija
Sent: February-01-19 7:03 AM
To: Cline, Gerald (Jeff); Hendry, Christopher; Parsons, Dave; Lanteigne, Stephen; LeBlanc, Carole L; Albert, Florence
Cc: Laking, Erin; Sandberg, Krista; Patirana, Anoma; Green, Barry
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Hi Jeff,

Thanks very much for your comments. As you'll see in the attached revised chart, I've added 'management measures' to the first bullet to reflect your comment below. I also moved the bullets that reflect the AAR, PMRA, FDA, VDD under the first bullet as it would apply to all of Canada, as I understand it. Make sense?

Copying others so that they are aware that this info is reflected and can work from this copy as they wish.

Carole/Florence – if you could have a look at this chart in Stephen's absence that would be appreciated.

Thanks again,

Nadija Paznar

From: Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>
Sent: Thursday, January 31, 2019 9:59 AM
To: Paznar, Nadija <Nadija.Paznar@dfo-mpo.gc.ca>; Cline, Gerald (Jeff) <Gerald.Cline@dfo-mpo.gc.ca>
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart

Hi Nadija,

Please see comments below from Jeff Cline – who is most familiar with sea lice management for Maritimes.

Cheers,
Erin

From: Cline, Gerald (Jeff) <Gerald.Cline@dfo-mpo.gc.ca>
Sent: Thursday, January 31, 2019 9:44 AM
To: Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>; Rose-Quinn, Tammy <Tammy.Rose-Quinn@dfo-mpo.gc.ca>
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Hi, attached, generally I would rebrand this, what is listed are not regulations per say they are management measures that are supported by acts and regulations i.e. licence conditions, NB is the only jurisdiction that the actions are clearly written within the aqua regs. Regulations / Management Measures would be more appropriate.

J

From: Paznar, Nadija <Nadija.Paznar@dfo-mpo.gc.ca>
Sent: Wednesday, January 30, 2019 2:11 PM
To: Hendry, Christopher <Christopher.Hendry@dfo-mpo.gc.ca>; Parsons, Dave <Dave.Parsons@dfo-mpo.gc.ca>; Albert, Florence <Florence.Albert@dfo-mpo.gc.ca>; Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>; Rose-Quinn, Tammy <Tammy.Rose-Quinn@dfo-mpo.gc.ca>; Lanteigne, Stephen <Stephen.Lanteigne@dfo-mpo.gc.ca>
Subject: For review: Salmon farming countries sea lice regs comparison chart

Dear colleagues,

First off, I'd like to introduce myself - I'm new to DFO and the aquaculture group since October coming from Global Affairs Canada. I work on the quadrilateral salmon aquaculture file with Barry and Alistair and require your assistance. Our Scottish counterparts have developed, in the context of work that they're doing on looking at interactions between wild and farmed salmon, a comparison chart on sea lice regulations for Atlantic salmon that they would like to publish online.

Grateful if you could review what I've drafted under the Atlantic Coast section in the attached from online DFO sources to ensure I've accurately summarized the regulations in your regions. Your input by Friday COB would be appreciated.

Thanks very much and please let me know if you have any questions.

Nadija Paznar
Senior Fisheries and Aquaculture Management Officer
Fisheries and Oceans Canada / Ministère des Pêches et Océans
Aquaculture Management / La gestion de l'aquaculture
200 Kent Street / 200, rue Kent
Ottawa, Ontario K1A 0E6
Telephone/Téléphone: [REDACTED]

s.16(2)(c)

No further information has been removed or severed from this page

Wilkinson, Davida

From: Sandberg, Krista
Sent: Tuesday, February 12, 2019 11:20 AM
To: Waddington, Zac
Subject: Re: For review: Salmon farming countries sea lice regs comparison chart

Oops. Sorry Zac. I feel like I've been apologizing a lot over the past few days. Need to start clarifying things before I jump in. Hopefully Nadija will follow up :)

Sent from my BlackBerry 10 smartphone on the Rogers network.

From: Waddington, Zac
Sent: Tuesday, February 12, 2019 11:06 AM
To: Sandberg, Krista; Paznar, Nadija
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Sorry I was actually hoping to clarify if it is in fact 0.2 gravids, or females more broadly. I'm not entirely sure what the case is,

Zac

From: Sandberg, Krista
Sent: February-12-19 11:04 AM
To: Paznar, Nadija
Cc: Waddington, Zac
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart

Hi Nadija,

Apologies on the delayed response on this one. We may be too late, but our Veterinarian Zac Waddington reviewed the document and had a comment about the lice threshold for Norway – note that it should read 0.2 **gravid** female lice, not just 0.2 female lice.

Cheers,
Krista.

s.16(2)(c)

Krista Sandberg
Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
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Canada

From: Waddington, Zac
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From: Sandberg, Krista
Sent: February-01-19 10:29 AM
To: Paylor, Adrienne; Waddington, Zac; McConnachie, Sarah
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart

FYI. I provided comments to the Pacific Region section

Krista Sandberg
Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Paznar, Nadija
Sent: February-01-19 7:03 AM
To: Cline, Gerald (Jeff); Hendry, Christopher; Parsons, Dave; Lanteigne, Stephen; LeBlanc, Carole L; Albert, Florence
Cc: Laking, Erin; Sandberg, Krista; Patirana, Anoma; Green, Barry
Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Hi Jeff,

Thanks very much for your comments. As you'll see in the attached revised chart, I've added 'management measures' to the first bullet to reflect your comment below. I also moved the bullets that reflect the AAR, PMRA, FDA, VDD under the first bullet as it would apply to all of Canada, as I understand it. Make sense?

Copying others so that they are aware that this info is reflected and can work from this copy as they wish.

Carole/Florence – if you could have a look at this chart in Stephen's absence that would be appreciated.

Thanks again,

Nadija Paznar

From: Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>
Sent: Thursday, January 31, 2019 9:59 AM
To: Paznar, Nadija <Nadija.Paznar@dfo-mpo.gc.ca>; Cline, Gerald (Jeff) <Gerald.Cline@dfo-mpo.gc.ca>
Subject: FW: For review: Salmon farming countries sea lice regs comparison chart

Hi Nadija,

Please see comments below from Jeff Cline – who is most familiar with sea lice management for Maritimes.

Cheers,
Erin

s.16(2)(c)

From: Cline, Gerald (Jeff) <Gerald.Cline@dfo-mpo.gc.ca>
Sent: Thursday, January 31, 2019 9:44 AM

To: Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>; Rose-Quinn, Tammy <Tammy.Rose-Quinn@dfo-mpo.gc.ca>

Subject: RE: For review: Salmon farming countries sea lice regs comparison chart

Hi, attached, generally I would rebrand this, what is listed are not regulations per say they are management measures that are supported by acts and regulations i.e. licence conditions, NB is the only jurisdiction that the actions are clearly written within the aqua regs. Regulations / Management Measures would be more appropriate.

J

From: Paznar, Nadija <Nadija.Paznar@dfo-mpo.gc.ca>

Sent: Wednesday, January 30, 2019 2:11 PM

To: Hendry, Christopher <Christopher.Hendry@dfo-mpo.gc.ca>; Parsons, Dave <Dave.Parsons@dfo-mpo.gc.ca>; Albert, Florence <Florence.Albert@dfo-mpo.gc.ca>; Laking, Erin <Erin.Laking@dfo-mpo.gc.ca>; Rose-Quinn, Tammy <Tammy.Rose-Quinn@dfo-mpo.gc.ca>; Lanteigne, Stephen <Stephen.Lanteigne@dfo-mpo.gc.ca>


Subject: For review: Salmon farming countries sea lice regs comparison chart

Dear colleagues,

First off, I'd like to introduce myself - I'm new to DFO and the aquaculture group since October coming from Global Affairs Canada. I work on the quadrilateral salmon aquaculture file with Barry and Alistair and require your assistance. Our Scottish counterparts have developed, in the context of work that they're doing on looking at interactions between wild and farmed salmon, a comparison chart on sea lice regulations for Atlantic salmon that they would like to publish online.

Grateful if you could review what I've drafted under the Atlantic Coast section in the attached from online DFO sources to ensure I've accurately summarized the regulations in your regions. Your input by Friday COB would be appreciated.

Thanks very much and please let me know if you have any questions.

Nadija Paznar
Senior Fisheries and Aquaculture Management Officer
Fisheries and Oceans Canada / Ministère des Pêches et Océans
Aquaculture Management / La gestion de l'aquaculture
200 Kent Street / 200, rue Kent
Ottawa, Ontario K1A 0E6
Telephone/Téléphone: 

s.16(2)(c)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Tuesday, February 26, 2019 11:02 AM
To: Waddington, Zac; Diamond, Maria
Subject: RE: Mortality and environemtnal data for farms we sampled

Yup. I'm on it ☺

Krista Sandberg
Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Waddington, Zac
Sent: February-26-19 10:59 AM
To: Sandberg, Krista; Diamond, Maria
Subject: FW: Mortality and environemtnal data for farms we sampled

Would you guys be able to pull together this data for Kristi please??

Zac

From: Miller-Saunders, Kristi
Sent: February-25-19 3:52 PM
To: Waddington, Zac
Cc: Paylor, Adrienne; Andrew Bateman
Subject: Mortality and environemtnal data for farms we sampled

I am following up on my request to get the finest scale mortality, environmental and treatment data (sea lice, antibiotic, other) as well as sea lice load data we can for the four farms we sampled in the SSHI:

Two were spring transfers in 2013: Marine Harvest Bell Island and Cermaq Venture. The Bell fish were moved to Okisollo in the fall

Two were fall transfers in 2013: Marine Harvest Larsen, which was eventually moved to Lees, and Cermaq Raza

We are trying to get information that will allow us to relate abrupt shifts in agent distributions, including shifts between live and dead sampled fish, with information on the environment and whether these shifts occurred around temporal periods where mortality was evident.

We are working these data up now, so hopefully this request can be filled without too much delay. We will be happy to share our findings with you to discuss your thoughts on interpretations.

Much appreciated,
Kristi

Kristi Miller-Saunders, PhD

Head, Molecular Genetics
Pacific Biological Station

3190 Hammond Bay Rd
Nanaimo BC V9T 6N7
250-756-7155
Kristi.Saunders@dfo-mpo.gc.ca

No information has been removed or severed from this page

Wilkinson, Davida

From: Sandberg, Krista
Sent: Wednesday, February 27, 2019 1:50 PM
To: Paylor, Adrienne; Waddington, Zac
Cc: McConnachie, Sarah
Subject: RE: Mortality and environemtnal data for farms we sampled

Zac, I should clarify that in a separate email chain, Kristi may be looking for raw industry data rather than the rolled up average abundance and percent mortality numbers that I prepared for her. I'm thinking of just sending her the industry reports from that time period and letting her sort through the data herself – unless you would rather that a pull out the data just for those farms that she requested.

Krista.

Krista Sandberg

Public Reporting Manager | Gestionnaire de rapports publics
Office | Bureau 250-286-5835
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From: Paylor, Adrienne
Sent: February-27-19 1:41 PM
To: Waddington, Zac
Cc: Sandberg, Krista; McConnachie, Sarah
Subject: FW: Mortality and environemtnal data for farms we sampled

Hey Zac do we need a Material Transfer Agreement to share this data or do you feel what we already have in place SSHI will over it?.....or maybe this kind of data doesn't require a MTA?

From: Miller-Saunders, Kristi
Sent: February-27-19 1:13 PM
To: Waddington, Zac
Cc: Paylor, Adrienne; Andrew Bateman
Subject: RE: Mortality and environemtnal data for farms we sampled

Thanks Zac

Kristi Miller-Saunders, PhD

Head, Molecular Genetics
Pacific Biological Station
3190 Hammond Bay Rd
Nanaimo BC V9T 6N7
250-756-7155
Kristi.Saunders@dfo-mpo.gc.ca

s.16(2)(c)

From: Waddington, Zac
Sent: February-26-19 11:00 AM
To: Miller-Saunders, Kristi

Cc: Paylor, Adrienne; Andrew Bateman

Subject: RE: Mortality and environemtnal data for farms we sampled

I'll get going on getting that data for you. Hopefully in the next day or two,

Zac

From: Miller-Saunders, Kristi

Sent: February-25-19 3:52 PM

To: Waddington, Zac

Cc: Paylor, Adrienne; Andrew Bateman

Subject: Mortality and environemtnal data for farms we sampled

I am following up on my request to get the finest scale mortality, environmental and treatment data (sea lice, antibiotic, other) as well as sea lice load data we can for the four farms we sampled in the SSHI:

Two were spring transfers in 2013: Marine Harvest Bell Island and Cermaq Venture. The Bell fish were moved to Okisollo in the fall

Two were fall transfers in 2013: Marine Harvest Larsen, which was eventually moved to Lees, and Cermaq Raza

We are trying to get information that will allow us to relate abrupt shifts in agent distributions, including shifts between live and dead sampled fish, with information on the environment and whether these shifts occurred around temporal periods where mortality was evident.

We are working these data up now, so hopefully this request can be filled without too much delay. We will be happy to share our findings with you to discuss your thoughts on interpretations.

Much appreciated,
Kristi

Kristi Miller-Saunders, PhD

Head, Molecular Genetics

Pacific Biological Station

3190 Hammond Bay Rd

Nanaimo BC V9T 6N7

250-756-7155

Kristi.Saunders@dfo-mpo.gc.ca

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Friday, March 1, 2019 4:40 PM
To: Patirana, Anoma; Waddington, Zac
Subject: FW: Event Report - Issuance of Warning Letter to Cermaq Canada Ltd.
Attachments: ML_AQUA_SealLiceClayoquot.doc

Importance: High

Sorry I didn't realize Zac wasn't cc'ed on this so I was waiting for his comments before I responded. I don't think anything needs to be corrected in the attached just cleaned up a bit to remove duplication. I'm a little uncomfortable making a public statement about changing COL before Allison makes a final decision on this. Maybe we could say we are reviewing our sea lice management approach or something more generic? Zac can you take a quick read to confirm this is all still accurate bullets in the attached?

Thx Adrienne

From: Patirana, Anoma
Sent: March-01-19 2:31 PM
To: Paylor, Adrienne
Subject: FW: Event Report - Issuance of Warning Letter to Cermaq Canada Ltd.
Importance: High

Hey, there can you or Zac review and provide any edits back to me to review (in Allison's absence)? Also, I think the answer to Michelle's question is yes we are planning to update the sea lice COL to better address compliance in the future.

From: Rainer, Michelle <Michelle.Rainer@dfo-mpo.gc.ca>
Sent: March-01-19 2:21 PM
To: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>; Girouard, Louise <Louise.Girouard@dfo-mpo.gc.ca>
Cc: Patirana, Anoma <Anoma.Patirana@dfo-mpo.gc.ca>; Webb, Allison <Allison.Webb@dfo-mpo.gc.ca>; Bate, Dan <Dan.Bate@dfo-mpo.gc.ca>
Subject: RE: Event Report - Issuance of Warning Letter to Cermaq Canada Ltd.

Hi,
[REDACTED] I don't think this will come up while I'm gone but if it does we already have lines (attached). We can add that C&P has reviewed the incident and issued a warning letter to the company. Aquaculture program, can you please provide info on whether there are plans to update COLs to better address compliance on sea lice in future?

Thanks,
Michelle

s.19(1)

From: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>
Sent: March-01-19 2:10 PM
To: Girouard, Louise <Louise.Girouard@dfo-mpo.gc.ca>
Cc: Rainer, Michelle <Michelle.Rainer@dfo-mpo.gc.ca>
Subject: FW: Event Report - Issuance of Warning Letter to Cermaq Canada Ltd.

FYI – Best, Leri

From: Doucette, Claire <Claire.Doucette@dfo-mpo.gc.ca>

Sent: 2019–March-01 1:09 PM

To: DFO.F PAC CP Area Chiefs / Chefs de Secteur CP PAC F.MPO <DFO.FPACCPAreaChiefs-ChefsdeSecteurCPPACF.MPO@dfo-mpo.gc.ca>; XPAC OPS/SDC Members <PACSDCMembers@dfo-mpo.gc.ca>

Cc: Rainer, Michelle <Michelle.Rainer@dfo-mpo.gc.ca>; Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>; Knight, Joe <Joe.Knight@dfo-mpo.gc.ca>; Tomlinson, Daniel <Daniel.Tomlinson@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>; Webb, Allison <Allison.Webb@dfo-mpo.gc.ca>; Waddington, Zac <Zac.Waddington@dfo-mpo.gc.ca>; Ballard, Michael <Michael.Ballard@dfo-mpo.gc.ca>

Subject: Event Report - Issuance of Warning Letter to Cermaq Canada Ltd.

Claire Doucette
Chief Aquaculture | Chef de secteur aquaculture
Conservation and Protection | Conservation et Protection
Pacific Region | Région du Pacifique
Fisheries and Oceans Canada | Pêches et Océans Canada
1520 Tamarac St., Campbell River, BC., V9W 3M5
claire.doucette@dfo-mpo.gc.ca
Phone | Téléphone: [REDACTED]
Facsimile | Télécopieur: (250) 754-0391
Government of Canada | Gouvernement du Canada

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s.16(2)(c)

MEDIA LINES

Sea Lice in Clayoquot

Approved by MinO October 30, 2018

- Seasonal and year-to-year variations in environmental parameters (eg.ocean salinity and temperature) and the number and species composition of wild salmon returns to an area are known to influence the abundance of sea lice on farms.
- In Clayoquot sound over the winter/spring of 2017-2018, the typical drop in salinity that comes with rains did not occur. This higher salinity resulted in increased lice production in the region and exacerbated the lice levels on farms.
- Earlier this year, Fisheries and Oceans Canada (DFO) collected sea lice from Cermaq Canada's Bawden site in the Clayoquot area and sent them to the BC Centre for Aquatic Health Sciences for analysis, which confirmed SLICE resistance. Those lice were later sent to researchers at the Atlantic Veterinary College who are undertaking work to better understand the genetic basis for SLICE resistance.
- The Department also initiated a review, which is still ongoing, of Cermaq Canada's sea lice management practices in this region to determine if relevant licence conditions have been followed appropriately.
- Under the Pacific Aquaculture Regulations, DFO requires salmon farming companies to regularly monitor and manage sea lice levels at their facilities in BC. DFO also regularly conducts assessments of sea lice abundance at these facilities.
- Companies in BC must submit a lice reduction plan if monitoring shows sea lice levels higher than three motile sea lice per farmed fish during the wild salmon outmigration period from March 1 to June 30 of each year. Motile lice are those at the free-moving stages of their life cycle.
- During most years, more than 90% of sites in BC are below the regulatory thresholds for sea lice during the wild salmon outmigration period (from March 1 to June 30 of each year). However, there were documented failures of SLICE treatment at Klemtu in 2013 and Esperanza Inlet in 2017 and now Clayoquot Sound in 2018.
- DFO is keeping a close eye on the issue of SLICE resistance. Research is under way, by DFO, industry, and academia, to find alternative methods to manage sea lice, and to better predict and track SLICE resistance. For instance, DFO is currently studying, or supporting research on, the use of Pacific perch as "cleaner fish" that eat sea lice off farmed fish and warm water baths to kill sea lice. More information on these projects can be found at www.dfo-mpo.gc.ca/aquaculture/sci-res/rd-eng.htm
- DFO is also supporting the licensing and approval process for alternative sea lice treatments, which are a necessary part of an integrated pest management approach.

About SLICE and hydrogen peroxide treatments:

- Salmon farming companies use an in-feed therapeutant called SLICE (emamectin benzoate) to reduce lice abundance. In British Columbia to date, SLICE has generally been a very effective tool in the management of sea lice at salmon farms.
- The rotational use of hydrogen peroxide with SLICE on farms is a key component of Integrated Pest Management (IPM). IPM aims to control pests with minimal reliance on drugs/pesticides and prevent

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Created on: 14-Jun-18
Created by: Hélène Taché
Docket #:

Last saved by: DFO-MPO
Revised: 8-Nov-18 3:53 PM

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the development of resistance.

- Hydrogen peroxide is widely used on Canada's east and west coasts to remove sea lice from cultured fish. This pesticide is not absorbed by the fish and is non-toxic to humans. It also dissipates as a neutralized substance quickly in the environment, causing no discernible far-field effect.

Issue: Reporter [REDACTED] has been in contact with the Department regarding a recent report from Living Oceans about the increase in Sea Lice resistance on the BC Coast. Reporter was sent earlier set of MINO approved lines, but has come back with additional questions.

Recommendation: Provide the following QA's to the reporter by email.

Approved by: Adrienne Paylor, Zac Waddington, Allison Webb, Andrew Thompson, Louise Girouard

Questions and Answers:

Q: The report states that sea lice are "out of control" at salmon farms on the west coast of B.C. this year because they have become drug resistant. Is this statement true?

- Sea lice levels were above threshold in a majority of Atlantic salmon sites (11 total) in the Clayoquot region during the 2018 outmigration period. In the rest of BC, only three sites had relatively brief and minor periods where lice levels were over the threshold during this same period.
- DFO regulators have watched carefully for indication of SLICE resistance.
- Ineffective SLICE treatment is not necessarily due to resistance. It may be a result of: poor feed uptake, poor timing of treatment and/or environmental events (including low dissolved oxygen, harmful algal blooms, weather events etc.) which prevent a proper feeding. Prior to 2017, more than 95% of SLICE treatments in the Clayoquot area were considered to be effective.
- In regions where ineffective SLICE treatment has emerged, in the past it has been able to be reversed by a period of discontinuing SLICE use and an introduction of genetically different lice from wild fish. In cases where the use of SLICE does not result in adequate reduction of sea lice, companies can apply to the province of British Columbia for a permit to use alternative treatments, including Paramove (a hydrogen peroxide bath). Please contact Cermaq or the Province of BC's Ministry of Environment for further information on this process.
- DFO has been working with the province of BC and industry to develop alternative tools to manage sea lice. New treatment methodology, and husbandry practices are becoming widely adopted along the coast, which are reducing the reliance on SLICE to manage lice at sites. Some examples include: mechanical removal technologies (eg. hydrolicer), hydrogen peroxide treatment, area-based management (eg. coordinated treatments, stocking and fallowing of sites in an area) and pre-treatment of smolts in the hatchery with anti-lice medication. The rotational use of these technologies is part of an Integrated Pest Management approach, which has been demonstrated to reduce the need for drugs/pesticides, and prevent the development of resistance.

Q: The report claims Fisheries and Oceans Canada knew as early as 2014 that resistance was developing in sea lice, but did not take measures to ensure the protection of wild juvenile salmon from the parasite. Measures could have included alternate treatments for sea lice ready for deployment when SLICE failed. Is this an accurate depiction?

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- DFO regulators have watched carefully for indication of SLICE resistance. DFO has been actively monitoring and analysing sea lice data for indication of SLICE resistance since 2011 and first noted concerns at Klemtu in 2015, Esperanza Inlet in 2017, and now Clayoquot Sound in 2018.
- Since the monitoring numbers in Clayoquot Sound from this spring was the strongest indication of ineffective SLICE treatment to date, DFO took action to perform a targeted audit and collected sea lice samples from Cermaq Canada's Bawden site and sent them to the BC Centre for Aquatic Health Sciences for analysis. SLICE resistance was confirmed by the lab. Samples were later sent to the Atlantic Veterinary College which is currently undertaking work to better understand SLICE resistance.
- DFO has supported the development and licencing of new lice treatment methodologies and continues to work in collaboration with BC and industry to make advancements in this area to address sea lice while minimising environmental impacts and risks to wild fish.
- Some examples include: the licencing for hydrogen peroxide use in BC, research into sea lice eating fish species, development of models to support area-based management, research into risk factors for SLICE resistance, the licencing of *Imvixa* (an in-feed drug used in hatchery to confer up to 9 months protection from sea louse infestation), and funding for implementation of various green technologies on sites.
- In addition, since 2014, industry has made significant investments in mechanical removal technologies (hydrolicer), hosted workshops on Integrated Pest Management techniques, and purchased and ordered well boats to facilitate peroxide and fresh water bath treatments.
- DFO has taken significant action and is currently investigating the management of lice at sites in Clayoquot by Cermaq Canada to determine if there has been non-compliance with the licence conditions. Due to the active investigation we cannot comment further at this time.

Q: The report claims that DFO has been contacted to comment on these claims, but that a Vancouver Sun reporter never received a response. Cermaq has also been contacted. Neither DFO or Cermaq release public records of the drug treatments used on farmed salmon. Is this true?

- In BC under DFO's Pacific Aquaculture Regulations all infeed treatments are publicly reported in the sea lice abundance reports online.
- In addition, DFO publicly reports the quantity of all drugs and pesticides deposited at each aquaculture facility under the national Aquaculture Activities Regulations (AAR). This information is posted on an annual basis starting in 2016 when the regulation came into effect. The 2017 report is currently being processed for posting. Please see: <http://www.dfo-mpo.gc.ca/aquaculture/management-gestion/apr-rpa-reporting-eng.htm>

Q: Has the Department been withholding information from The Minister of Agriculture's Advisory Council on Finfish Aquaculture (MACCFA)?

- The Minister of Agriculture's Advisory Council on Finfish Aquaculture (MAACFA) is a province of BC led process of which DFO has not been a member, however it has attended a few meetings at the request of the Council to provide responses to specific questions and provided the most up to date available information at that time.
- Sea lice data is posted publicly on DFO's website and is updated regularly for increased transparency. Claims that DFO is deliberately hiding data are untrue.

Issue: [REDACTED] Globe and Mail ([REDACTED]). She is working on a story about Cermaq closing one of its sites, apparently in relation to sea lice concerns. She has already spoken to Cermaq and has a follow-up question for DFO:
Given the level of sea lice infestations in Clayoquot Sound this year, is DFO doing any additional monitoring or enforcement in the area?

Deadline: Friday, September 21 at 3:00 p.m.

Approved by: Zac Waddington, Adrienne Paylor, Andy Thomson, Bonnie Antcliffe (A/RDG Pacific), shared FYI for awareness with JF LaRue, Philippe Morel, Wayne Moore and Arran McPherson

Media lines:

- Fisheries and Oceans Canada (DFO) is confident in the monitoring being done in the Clayoquot area by environmental non-government groups, and third party environmental consultants hired by Cermaq. For this reason, DFO determined that resources could be better directed to furthering research into SLICE resistance (SLICE is approved for use in Canada as an in-feed therapeutic used by the salmon aquaculture industry to manage sea lice. It can only be administered to farmed fish under veterinary prescription).
- DFO is keeping a close eye on the issue of SLICE resistance. The Department collected sea lice from Cermaq Canada's Bawden site in the Clayoquot area and sent them to the BC Centre for Aquatic Health Sciences for analysis, which confirmed SLICE resistance. Those lice were later sent to researchers at the Atlantic Veterinary College who are undertaking work to better understand the genetic basis for SLICE resistance.
- During most years, more than 90% of sites in BC are below the regulatory thresholds for sea lice during the wild salmon outmigration period (from March 1 to June 30 of each year). However, there were documented failures of SLICE treatment at Klemtu in 2015 and Esperanza Inlet in 2017 and now Clayoquot Sound in 2018.
- Research is under way, by DFO, industry, and academia, to find alternative methods to manage sea lice, and to better predict and track SLICE resistance. For instance, DFO is currently studying, or supporting research on, the use of Pacific perch as "cleaner fish" that eat sea lice off farmed fish and warm water baths to kill sea lice. More information on these projects can be found at www.dfo-mpo.gc.ca/aquaculture/sci-res/rd-eng.htm
- DFO is also supporting the licensing and approval process for alternative sea lice treatments, which are a necessary part of an integrated pest management approach.

G & M follow-up question: Have there been any OTHER B.C. fish farm sites closed as a result of sea lice concerns in 2018 to date?

Approved by : Bernie Taekema, Brenda McCorquodale, Allison Webb, Jennifer Nener, RDG
FYI to NHQ Oct 3, 2018

s.19(1)

- Under the *Pacific Aquaculture Regulations*, DFO requires salmon farming companies to regularly monitor and manage sea lice levels at their facilities in BC. DFO also regularly conducts assessments of sea lice abundance at these facilities. approved
- Companies in BC must submit a lice reduction plan if monitoring shows sea lice levels higher than three motile sea lice per farmed fish during the wild salmon

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Revised: 8-Nov-18 3:53 PM

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outmigration period from March 1 to June 30 of each year. Motile lice are those at the free-moving stages of their life cycle. **approved**

- DFO has not closed any aquaculture sites due to sea lice concerns; however, the Department has delayed approval of applications to increase production in cases where sea lice levels were above the regulatory threshold. **new**

Issue:

A number of farms in British Columbia's Clayoquot Sound area, all owned by Cermaq Canada, are experiencing extremely high sea lice counts this spring. This has already received media attention and lines have been approved.

Since then, lab tests have confirmed that the sea lice at least one of the farms are resistant to SLICE, which is the chemical treatment most widely used to control sea lice in BC. A "responsive" section has been added to media lines in anticipation of further media requests.

Media lines:

- Fisheries and Oceans Canada (DFO) is aware of the sea lice exceedances at Cermaq Canada's facilities in Clayoquot and has been in ongoing discussions with the company since January 2018 about measures to reduce sea lice levels. **approved**
- The Department is reviewing Cermaq Canada's sea lice management practices at these farms to determine if relevant licence conditions have been followed appropriately. **approved**
- Under the Pacific Aquaculture Regulations, DFO requires salmon farming companies to regularly monitor and manage sea lice levels at their facilities in BC. DFO also regularly conducts assessments of sea lice abundance at these facilities. **approved**
- Companies in BC must submit a lice reduction plan if monitoring shows sea lice levels higher than three motile sea lice per farmed fish during the wild salmon outmigration period from March 1 to June 30 of each year. Motile lice are those at the free-moving stages of their life cycle. **approved**
- DFO makes reports on the numbers of sea lice at BC aquaculture farms available to the public at www.dfo-mpo.gc.ca/aquaculture/protect-protege/parasites-eng.html. **approved**
- Salmon farming companies use an in-feed therapeutant called SLICE (emamectin benzoate) to reduce lice abundance. In cases where the use of SLICE does not result in adequate reduction of sea lice, companies can apply to the province of British Columbia for a permit to use alternative treatments, including Paramove (a hydrogen peroxide bath). Please contact Cermaq or the

Province of BC's Ministry of Environment for further information on this process. **approved**

- Hydrogen peroxide is widely used around the world, including elsewhere on Canada's west coast, with excellent effect and no demonstrable effects to the ecosystem. This pesticide is not absorbed by the fish and is non-toxic to humans. It also dissipates as a neutralized substance quickly in the environment and causes no discernible far-field effect. **approved**
- Our fish health veterinarians have requested documentation to determine the appropriateness of treatments undertaken at these farms, and to ensure that all other treatment and harvest options were duly considered by Cermaq. Financial considerations would not be recognized as justification for exclusion of otherwise effective lice management options. **approved**
- This is not a formal investigation under the Fisheries Act or regulations; however, if there has been non-compliance with the licence conditions, DFO will address the matter with an appropriate enforcement response. **approved**

Responsive on SLICE resistance (new)

- DFO collected sea lice from Cermaq Canada's Bawden site in the Clayoquot area and sent them to the BC Centre for Aquatic Health Sciences for analysis, which confirmed SLICE resistance. **new**
- In BC, SLICE has generally been a very effective tool in the management of sea lice at salmon farms. During most years, more than 90% of sites are below the regulatory thresholds for sea lice during the wild salmon outmigration period (from March 1 to June 30 of each year). **new**
- SLICE resistance is an emerging issue in BC, with failures of treatment documented at Klemtu in 2015, Esperanza Inlet in 2017 and now Clayoquot sound in 2018. **new**
- Research is under way, by DFO, industry, and academia, to find alternative methods to manage sea lice, and to better predict and track SLICE resistance. For instance, DFO is currently studying, or supporting research on, the use of Pacific perch as "cleaner fish" that eat sea lice off farmed fish and warm water baths to kill sea lice. More information on these projects can be found at www.dfo-mpo.gc.ca/aquaculture/sci-res/rd-eng.htm. **New**
- DFO is also supporting the licensing and approval process for alternative sea lice treatments, which are a necessary part of an integrated pest management approach. **New**

Program Contacts: Zac Waddington, Simon Jones

Communications Contact: Michelle Rainer

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Created on: 14-Jun-18
Created by: Hélène Taché
Docket #:

Last saved by: DFO-MPO
Revised: 8-Nov-18 3:53 PM

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Wilkinson, Davida

From: Sandberg, Krista
Sent: Wednesday, March 6, 2019 2:09 PM
To: Waddington, Zac; McConnachie, Sarah
Subject: RE: SL counts on day of Slice treatment

Ok. That's what I thought too. There were 3 pens sampled on that day, so a full event. I left it in but excluded the sample done 9 days later.

Thanks ☺

Krista Sandberg

Aquaculture Data and Public Reporting Manager |
Gestionnaire de données sur l'aquaculture et de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Waddington, Zac
Sent: March-06-19 1:55 PM
To: Sandberg, Krista; McConnachie, Sarah
Subject: RE: SL counts on day of Slice treatment

SLICE shouldn't affect the lice on the fish that early so yes they could be included. But if they don't need that pen as one of the three for a sampling event there'd be nothing wrong with excluding it either. If that makes sense?

Zac

From: Sandberg, Krista
Sent: March-06-19 1:49 PM
To: Waddington, Zac; McConnachie, Sarah
Subject: SL counts on day of Slice treatment

Hi Zac and Sarah – quick question for you – when doing sea lice abundance, we exclude any counts done 21 days after the start of a Slice treatment. There was a facility in January that did counts on the day the Slice treatment started. Should I include those in the abundance estimate or no?

Krista Sandberg

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s.16(2)(c)



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Wilkinson, Davida

From: Sandberg, Krista
Sent: Wednesday, March 6, 2019 2:42 PM
To: Waddington, Zac; McConnachie, Sarah
Subject: January sea lice abundance report ready for your review

Hi Zac and Sarah,

The January sea lice report is ready for your review. A couple things to note:

1. There were a number of MH/Mowi sites that have treatments planned for February – I didn't include these in the comments to the public as these sites were not near or over threshold in January. [REDACTED]
2. Please take a look at the comments for the Cermaq sites – I think a couple of them should have sampled bi-weekly

Summary: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\2019 Farm Level Sea Lice Summary.xlsx

Working file: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\SL Farm Level Calculator 2019.xlsx

Krista Sandberg

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s.16(2)(c)

s.21(1)(a)

s.21(1)(b)

| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Number of Counts | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chlamys | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|-----------------------|------------------|----------|------------|------------------|------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|---|--|------------|------------|-----|---|
| 1537 | Cermaq Canada | Bare Bluff | 49.37702 | -125.79902 | 2.3 | 1 | 8.9% | 4.80 | 0.03 | 0.02 | Medicinal bath treatment | Traitement médicamenteux dans un bain | 2 | | | EXCEEDED 20-Jan (8.98); Should have been doing bi-weekly counts - last exceedance was 15-Dec (3.03); H202 beginning 31-Jan. |
| 520 | Cermaq Canada | Bedwell | 49.28548 | -125.81247 | 2.3 | 1 | 10.06% | 4.05 | 0.75 | 0.07 | Management action planned (Medicinal bath treatment) | Mesure de gestion planifiée (Traitement médicamenteux dans un bain) | 2 | | | EXCEEDED 22-Jan (10.08) |
| 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 1 | 0.25 | 0.12 | 0.00 | 0.17 | | | 2 | | | |
| 1144 | Cermaq Canada | Burdwood | 50.7969 | -126.49581 | 3.3 | 1 | 1.42 | 0.38 | 1.27 | 1.98 | | | 1 | | | |
| 458 | Cermaq Canada | Cypress Harbour | 50.83772 | -126.66313 | 3.3 | 2 | 0.40 | 0.25 | 0.56 | 0.60 | | | Breed | | | |
| 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.02 | | | 1 | | | |
| 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 1 | 0.05 | 0.05 | 0.27 | 1.75 | | | 1 | | | |
| 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 1 | 0.02 | 0.00 | 0.00 | 0.08 | | | 1 | | | |
| 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | 1 | 3.88% | 2.55 | 0.02 | 0.00 | Management action planned (Medicinal bath treatment) | Mesure de gestion planifiée (Traitement médicamenteux dans un bain) | 2 | | | EXCEEDED 7-Jan (3.88) - Should be bi-weekly counts. Monthly report says no action required. Added comment for bath treatment after discussion with Zac but please advise if this is not appropriate. VS |
| 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 1 | 1.47 | 1.05 | 0.02 | 0.30 | | | 2 | | | changed to VC1 |
| 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | | | 1 | | | |
| 778 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 1 | 0.45 | 0.20 | 0.00 | 0.20 | | | 2 | | | |
| 306 | Cermaq Canada | Venture Point | 50.30241 | -125.33778 | 3.2 | 0 | | | | | Fallow | Mise en jachère | 2 | | | |
| 871 | Grig Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 1 | 0.08 | 0.02 | 0.00 | 0.00 | | | 1 | | | |
| 1789 | Grig Seafood BC | Conception | 49.65973 | -126.47587 | 2.4 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 1697 | Grig Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 2 | | | transfers began 5-Dec, probably should have done some sampling in January |
| 1863 | Grig Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | 1 | 1.48 | 0.88 | 0.00 | 0.00 | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 2 | | | |
| 1762 | Grig Seafood BC | Gore | 49.6466 | -126.43167 | 2.4 | 1 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 2 | | | |
| 1862 | Grig Seafood BC | Hecate | 49.86799 | -126.7573 | 2.4 | 2 | 0.56 | 0.53 | 0.00 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | SLICE 31-Dec, H202 17-Jan; counts 6-Jan and 17-21 Jan not included (post slice); 2 counts, 1st 6 pens |
| 1849 | Grig Seafood BC | Muchalat North | 49.64394 | -126.3953 | 2.4 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | | | 1 | | | |
| 1825 | Grig Seafood BC | Noo-la | 50.60799 | -126.36301 | 3.3 | 2 | 0.24 | 0.08 | 0.97 | 2.19 | | | 1 | | | |
| 332 | Grig Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0 | | | | | Fallow | Mise en jachère | 2 | | | |
| 746 | Grig Seafood BC | Site 13 | 49.6291 | -123.84265 | 3.1 | 0 | | | | | Fallow | Mise en jachère | 2 | | | |
| 1079 | Grig Seafood BC | Steamer | 49.8868 | -126.7911 | 2.4 | 1 | 0.60 | 0.48 | 0.05 | 0.00 | | | 1 | | | |
| 7273 | Grig Seafood BC | Tsa-ya | 50.61225 | -126.33212 | 3.3 | 1 | 0.33 | 0.13 | 0.43 | 8.05 | | | 1 | | | |
| 1839 | Grig Seafood BC | Wa-twa | 50.60106 | -126.34741 | 3.3 | 1 | 0.55 | 0.08 | 0.65 | 5.35 | | | 1 | | | |
| 1705 | Grig Seafood BC | Williamson | 49.65623 | -126.42849 | 2.4 | 1 | 0.02 | 0.00 | 0.00 | 0.00 | | | 1 | | | |
| 7714 | Marine Harvest Canada | Alexander | 52.67648 | -128.57494 | 3.5 | 3 | 0.43 | 0.07 | 1.78 | 3.82 | | | 1 | | | H202 planned for late February |
| 1300 | Marine Harvest Canada | Athorpa | 50.47531 | -125.80975 | 3.2 | 4 | 1.99 | 0.18 | 1.43 | 2.76 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 4 counts, 2nd 2 pens; Treatment planned for late February |

s.20(1)(b)

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|------|-----------------------|--------------------------|----------|------------|-----|------|------|------|------|---|--|---|---|
| 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 0.33 | 0.13 | 0.83 | 0.03 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 3 counts of 2 pens, recent transfer |
| 790 | Marine Harvest Canada | Chancellor Channel | 50.41723 | -125.66284 | 3.2 | 1.04 | 0.55 | 0.10 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | Slice 17-Dec, single count: 1-Jan not included, post Slice; 4 counts, 2nd 4th 2 pens |
| 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 0.61 | 0.20 | 8.92 | 3.06 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 2nd 4th 2 pens, 3rd 4 pens; Slice planned for mid-February |
| 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 1.33 | 0.55 | 1.36 | 0.30 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | single count of 5 pens, single pen 30-Jan not included; Slice planned for mid-February changed to y2 |
| 1293 | Marine Harvest Canada | Duncan Island | 50.8195 | -127.55568 | 3.4 | 0.67 | 0.31 | 0.57 | 0.15 | | | 2 | single pen 16-Jan not included; Slice planned for mid-February; changed to y2 |
| 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.4199 | 3.5 | 0 | 0.10 | 0.00 | 0.00 | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | will be empty early February |
| 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 2.14 | 0.60 | 2.50 | 2.13 | Management action planned (Mechanical removal treatment); Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement par retrait mécanique); La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | single pen 1-Jan moved to December; 5 counts, 1st 3rd 2 pens; 5th 4 pens; EXCEEDED 26-Jan (3.58), 29-Jan (3.39), unspecified treatment planned for mid-February |
| 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 0 | | | | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | changed to y2 |
| 1691 | Marine Harvest Canada | Kid Bay - post-treatment | 52.80048 | -128.40111 | 3.5 | 1 | 0.05 | 0.02 | 0.05 | Medicinal bath treatment | Traitement médicamenteux dans un bain | 2 | pre/post treatment averages - H2O2 all month, difficult to separate, review if you feel necessary |
| 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 0.07 | 0.01 | 0.50 | 0.16 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 3 counts, 2nd 2 pens |
| 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 0.97 | 0.47 | 0.08 | 0.02 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 2nd 4th 2 pens |

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|------|-----------------------|----------------|----------|------------|-----|---|------|------|------|------|--|---|-------|--|
| 1238 | Marine Harvest Canada | Mahatta West | 50.469 | -127.83538 | 2.4 | 4 | 0.00 | 0.00 | 0.06 | 0.00 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 1st 3rd 2 pens |
| 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 2 | 0.07 | 0.00 | 0.43 | 0.17 | | | 2 | |
| 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 5 | 0.10 | 0.02 | 0.19 | 0.09 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 5 counts, 1st 3rd 5th 2 pens |
| 211 | Marine Harvest Canada | Oksillo | 50.30946 | -125.31618 | 3.2 | 0 | | | | | Fallow | Mise en jachère | | |
| 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | 3 | 2.36 | 1.19 | 0.56 | 0.89 | In-feed treatment; Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 3 counts, 1st 2 pens; Slice 21-Jan, EXCEEDED 30-Jan (3.20) 2 pen count not included post Slice |
| 141 | Marine Harvest Canada | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | 4 | 0.68 | 0.41 | 3.46 | 1.87 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | single pen 1-Jan moved to December; 4 counts, 1st 3rd 2 pens |
| 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | |
| 1382 | Marine Harvest Canada | Robertson | 50.93155 | -127.42258 | 3.4 | 2 | 3.95 | 2.45 | 3.00 | 1.43 | Management action planned (In-feed treatment) | Mesure de gestion planifiée (Traitement administré dans l'alimentation) | 2 | EXCEEDED 20-Jan (3.52), 25-Jan (4.35); Slice starting 1st week February; changed to YC2 |
| 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | |
| 1136 | Marine Harvest Canada | Shaw Point | 50.48577 | -125.88981 | 3.2 | 3 | 1.13 | 0.31 | 1.92 | 0.21 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | Breed | 3 counts, 1st 4 pens, 2nd 2 pens |
| 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 5 | 0.29 | 0.07 | 0.20 | 0.11 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 4th 2 pens |
| 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.5004 | 3.4 | 4 | 0.10 | 0.03 | 0.56 | 0.09 | | | 2 | changed to YC2 |
| 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 4 | 4.31 | 2.61 | 0.43 | 0.55 | In-feed Treatment; Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 1st 3rd 2 pens; EXCEEDED 1-Jan (3.75), 15-Jan (5.98), 21-Jan (4.70), 30-Jan (4.43); Slice 21-Jan, single count 30-Jan not included - Should we include the count on the day that Slice was started? KS |

s.20(1)(b)

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|-----|-----------------------|--------------------------------|----------|------------|-----|---|------|------|------|------|---|--|---|---|
| 465 | Marine Harvest Canada | Swanson | 50.61871 | -126.70473 | 3.3 | 5 | 0.85 | 0.42 | 3.45 | 0.32 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 5 counts, 1st 3rd 5th 2 pens; Slice planned for mid-February |
| 820 | Marine Harvest Canada | Wicklow Point - post treatment | 50.78659 | -126.69153 | 3.3 | 2 | 0.70 | 0.36 | 0.73 | 0.36 | | | 1 | |
| 820 | Marine Harvest Canada | Wicklow Point - pre treatment | 50.78659 | -126.69153 | 3.3 | 3 | 1.70 | 0.76 | 1.26 | 0.16 | Mechanical removal treatment | Traitement par retrait mécanique | 1 | very hydrolicerl |

s.20(1)(b)

| Facility Reference No | Facility Name | Sampling Done This Month | If No Sampling, Explain | Sampling Event Start Date | Pen ID | Reference pen | entry date | Pen Sample Date | Number of Fish Sampled | Sampling Method | Adult Females L. salmonis | Motile Caligus | Action Taken | Start Date (if Rx or PC approval) | Comments | sh | mot_per_h | chal_per_h | cal_per_h |
|-----------------------|---|--------------------------|-------------------------|---------------------------|--------|---------------|------------|-----------------|------------------------|-----------------|---------------------------|----------------|--------------|-----------------------------------|-------------------|------|-----------|------------|-----------|
| 78 | Phillips Arm, Cardero Channel | Y | | 7-Jan-19 | 0001 | Y | | 7-Jan-19 | 20 | Box seine | 30 | 49 | 35 | 14 | Treatment pending | 1.50 | 2.45 | 1.75 | 0.70 |
| 78 | Phillips Arm, Cardero Channel | Y | | 7-Jan-19 | 0006 | N | | 8-Jan-19 | 20 | Box seine | 9 | 15 | 14 | 18 | Treatment pending | 0.45 | 0.75 | 0.70 | 0.90 |
| 78 | Phillips Arm, Cardero Channel | Y | | 13-Jan-19 | 0001 | Y | | 13-Jan-19 | 20 | Box seine | 41 | 78 | 0 | 0 | Treatment pending | 2.05 | 3.90 | 0.00 | 0.00 |
| 78 | Phillips Arm, Cardero Channel | Y | | 13-Jan-19 | 0007 | N | | 14-Jan-19 | 20 | Box seine | 17 | 52 | 0 | 17 | Treatment pending | 0.85 | 2.60 | 0.00 | 0.85 |
| 78 | Phillips Arm, Cardero Channel | Y | | 13-Jan-19 | 0008 | N | | 15-Jan-19 | 20 | Box seine | 15 | 35 | 0 | 16 | Treatment pending | 0.75 | 1.75 | 0.00 | 0.80 |
| 78 | Phillips Arm, Cardero Channel | Y | | 20-Jan-19 | 0001 | Y | | 20-Jan-19 | 20 | Box seine | 38 | 73 | 11 | 37 | Treatment ongoing | 1.90 | 3.65 | 0.55 | 1.85 |
| 78 | Phillips Arm, Cardero Channel | Y | | 20-Jan-19 | 0004 | N | | 20-Jan-19 | 20 | Box seine | 13 | 24 | 3 | 39 | Treatment ongoing | 0.65 | 1.20 | 0.15 | 1.95 |
| 78 | Phillips Arm, Cardero Channel | Y | | 30-Jan-19 | 0005 | N | | 20-Jan-19 | 20 | Box seine | 31 | 65 | 13 | 4 | Treatment ongoing | 1.55 | 3.25 | 0.65 | 0.20 |
| 78 | Phillips Arm, Cardero Channel | Y | | 30-Jan-19 | 0001 | Y | | 30-Jan-19 | 20 | Box seine | 34 | 88 | 41 | 11 | None required | 1.70 | 4.40 | 2.05 | 0.55 |
| 78 | Phillips Arm, Cardero Channel | Y | | 30-Jan-19 | 0004 | N | | 30-Jan-19 | 20 | Box seine | 16 | 40 | 34 | 5 | None required | 0.80 | 2.00 | 1.70 | 0.25 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 10-Jan-19 | L801 | N | | 10-Jan-19 | 20 | Box seine | 15 | 33 | 15 | 5 | None required | 0.75 | 1.65 | 0.75 | 0.25 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 10-Jan-19 | L802 | Y | | 10-Jan-19 | 20 | Box seine | 13 | 46 | 0 | 0 | None required | 0.65 | 2.30 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 10-Jan-19 | L803 | N | | 10-Jan-19 | 20 | Box seine | 10 | 24 | 4 | 0 | None required | 0.50 | 1.20 | 0.20 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 17-Jan-19 | L801 | N | | 17-Jan-19 | 20 | Box seine | 14 | 25 | 0 | 0 | None required | 0.70 | 1.25 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 17-Jan-19 | L802 | Y | | 17-Jan-19 | 20 | Box seine | 7 | 19 | 0 | 0 | None required | 0.35 | 0.95 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 24-Jan-19 | L801 | N | | 24-Jan-19 | 20 | Box seine | 8 | 9 | 0 | 0 | None required | 0.40 | 0.45 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 24-Jan-19 | L802 | Y | | 24-Jan-19 | 20 | Box seine | 9 | 11 | 0 | 0 | None required | 0.45 | 0.55 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 24-Jan-19 | L803 | N | | 24-Jan-19 | 20 | Box seine | 9 | 11 | 0 | 0 | None required | 0.40 | 0.65 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 31-Jan-19 | L802 | Y | | 31-Jan-19 | 20 | Box seine | 8 | 13 | 0 | 0 | None required | 0.40 | 0.65 | 0.00 | 0.00 |
| 100 | Lees Bay, N. Shore, West Thurlow Is. | Y | | 31-Jan-19 | L805 | N | | 31-Jan-19 | 20 | Box seine | 4 | 9 | 0 | 0 | None required | 0.20 | 0.45 | 0.00 | 0.00 |
| 136 | Cliff Bay Smooom Sound, Whist Peninsula | N | Fallow | | | | | | | | | | | | | | | | |
| 138 | Dunsterville Bay, Hoskyn Channel | N | Fallow | | | | | | | | | | | | | | | | |
| 141 | Port Elizabeth, Gifford Island | Y | | 7-Jan-19 | PE02 | Y | | 7-Jan-19 | 20 | Box seine | 9 | 10 | 79 | 18 | None required | 0.45 | 0.50 | 3.95 | 0.90 |
| 141 | Port Elizabeth, Gifford Island | Y | | 7-Jan-19 | PE08 | N | | 7-Jan-19 | 20 | Box seine | 5 | 6 | 47 | 18 | None required | 0.25 | 0.30 | 2.35 | 0.90 |
| 141 | Port Elizabeth, Gifford Island | Y | | 13-Jan-19 | PE02 | Y | | 13-Jan-19 | 20 | Box seine | 9 | 18 | 95 | 30 | None required | 0.45 | 0.90 | 4.75 | 1.50 |
| 141 | Port Elizabeth, Gifford Island | Y | | 13-Jan-19 | PE09 | N | | 14-Jan-19 | 20 | Box seine | 12 | 23 | 63 | 76 | None required | 0.60 | 1.15 | 3.15 | 3.80 |
| 141 | Port Elizabeth, Gifford Island | Y | | 13-Jan-19 | PE10 | N | | 15-Jan-19 | 20 | Box seine | 10 | 13 | 31 | 76 | None required | 0.50 | 0.65 | 1.55 | 3.80 |
| 141 | Port Elizabeth, Gifford Island | Y | | 19-Jan-19 | PE02 | Y | | 19-Jan-19 | 20 | Box seine | 5 | 11 | 121 | 31 | None required | 0.25 | 0.55 | 6.05 | 1.55 |
| 141 | Port Elizabeth, Gifford Island | Y | | 19-Jan-19 | PE06 | N | | 19-Jan-19 | 20 | Box seine | 4 | 7 | 32 | 16 | None required | 0.20 | 0.35 | 1.60 | 0.80 |
| 141 | Port Elizabeth, Gifford Island | Y | | 28-Jan-19 | PE02 | Y | | 28-Jan-19 | 20 | Box seine | 18 | 36 | 142 | 35 | None required | 0.90 | 1.80 | 7.10 | 3.15 |
| 141 | Port Elizabeth, Gifford Island | Y | | 28-Jan-19 | PE03 | N | | 29-Jan-19 | 20 | Box seine | 7 | 9 | 53 | 62 | None required | 0.35 | 0.45 | 2.65 | 3.10 |
| 141 | Port Elizabeth, Gifford Island | Y | | 28-Jan-19 | PE04 | N | | 29-Jan-19 | 20 | Box seine | 9 | 13 | 27 | 46 | None required | 0.45 | 0.65 | 1.35 | 2.30 |
| 143 | Larsen Island, Indian Channel | N | Fallow | | | | | | | | | | | | | | | | |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 5-Jan-19 | K003 | Y | | 5-Jan-19 | 20 | Box seine | 0 | 0 | 5 | 4 | None required | 0.00 | 0.00 | 0.25 | 0.20 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 5-Jan-19 | K010 | N | | 5-Jan-19 | 20 | Box seine | 1 | 2 | 13 | 1 | None required | 0.05 | 0.10 | 0.65 | 0.05 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 5-Jan-19 | K011 | N | | 5-Jan-19 | 20 | Box seine | 0 | 3 | 12 | 1 | None required | 0.00 | 0.15 | 0.60 | 0.05 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 12-Jan-19 | K003 | Y | | 12-Jan-19 | 20 | Box seine | 0 | 1 | 6 | 3 | None required | 0.00 | 0.05 | 0.30 | 0.15 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 12-Jan-19 | K006 | N | | 12-Jan-19 | 20 | Box seine | 0 | 2 | 9 | 2 | None required | 0.00 | 0.10 | 0.45 | 0.10 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 19-Jan-19 | K003 | Y | | 19-Jan-19 | 20 | Box seine | 0 | 2 | 6 | 0 | None required | 0.00 | 0.10 | 0.30 | 0.00 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 19-Jan-19 | K008 | N | | 19-Jan-19 | 20 | Box seine | 0 | 0 | 21 | 10 | None required | 0.00 | 0.00 | 1.05 | 0.50 |
| 144 | Koskimo Bay, Quatsino Sound | Y | | 19-Jan-19 | K009 | N | | 19-Jan-19 | 30 | Box seine | 0 | 2 | 16 | 9 | None required | 0.00 | 0.07 | 0.53 | 0.30 |
| 169 | Barley, San Mateo Bay, Berkeley Dist. | N | Fallow | | | | | | | | | | | | | | | | |
| 211 | Sonora Island, Oksolot Channel | N | Fallow | | | | | | | | | | | | | | | | |
| 221 | Vantage Point, Sechart Inlet | N | Fallow | | | | | | | | | | | | | | | | |
| 234 | Dixon Point, Shelter Inlet | Y | | 2-Jan-19 | 101 | Y | | 2-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 1 | None required | 0.00 | 0.00 | 0.00 | 0.05 |
| 234 | Dixon Point, Shelter Inlet | Y | | 5-Jan-19 | 108 | N | | 5-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 0 | None required | 0.00 | 0.00 | 0.00 | 0.00 |
| 234 | Dixon Point, Shelter Inlet | Y | | 5-Jan-19 | 106 | N | | 5-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 0 | None required | 0.00 | 0.00 | 0.00 | 0.00 |
| 303 | Glacial Creek, near Jarvis Inlet | Y | | 23-Jan-19 | GC11 | N | | 23-Jan-19 | 20 | Full seine | 3 | 5 | 0 | 0 | None required | 0.15 | 0.25 | 0.00 | 0.00 |
| 303 | Glacial Creek, near Jarvis Inlet | Y | | 23-Jan-19 | GC12 | N | | 23-Jan-19 | 20 | Full seine | 1 | 7 | 0 | 0 | None required | 0.05 | 0.35 | 0.00 | 0.00 |
| 303 | Glacial Creek, near Jarvis Inlet | Y | | 23-Jan-19 | GC14 | N | | 23-Jan-19 | 20 | Full seine | 2 | 6 | 0 | 0 | None required | 0.10 | 0.30 | 0.00 | 0.00 |
| 304 | Raza Island, Raza Passage | Y | | 19-Jan-19 | 109 | Y | | 19-Jan-19 | 20 | Full seine | 15 | 26 | 0 | 12 | None required | 0.75 | 1.30 | 0.00 | 0.60 |
| 304 | Raza Island, Raza Passage | Y | | 20-Jan-19 | 102 | N | | 20-Jan-19 | 20 | Full seine | 26 | 35 | 0 | 0 | None required | 1.30 | 1.75 | 0.00 | 0.00 |
| 304 | Raza Island, Raza Passage | Y | | 20-Jan-19 | 104 | N | | 20-Jan-19 | 20 | Full seine | 22 | 27 | 1 | 6 | None required | 1.10 | 1.35 | 0.05 | 0.30 |
| 306 | Venture Point, Sonora Island | N | Fallow | | | | | | | | | | | | | | | | |
| 314 | Ross Pass, Northeast McKay Island | Y | | 19-Jan-19 | 101 | Y | | 19-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 0 | None required | 0.00 | 0.00 | 0.00 | 0.00 |
| 314 | Ross Pass, Northeast McKay Island | Y | | 20-Jan-19 | 105 | N | | 20-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 0 | None required | 0.00 | 0.00 | 0.00 | 0.00 |
| 314 | Ross Pass, Northeast McKay Island | Y | | 20-Jan-19 | 103 | N | | 20-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 0 | None required | 0.00 | 0.00 | 0.00 | 0.00 |
| 332 | Salter, Northwest Sechart Inlet | N | Fallow | | | | | | | | | | | | | | | | |
| 377 | Rickley Bay, East Thurlow Island | N | Fallow | | | | | | | | | | | | | | | | |
| 378 | Thurlow Point South, Noddes Channel | Y | | 1-Jan-19 | SP02 | Y | | 1-Jan-19 | 20 | Box seine | 48 | 65 | 3 | 0 | Treatment pending | 2.40 | 3.25 | 0.15 | 0.00 |
| 380 | Sonora Pt., Noddes Channel | Y | | 1-Jan-19 | SP09 | N | | 1-Jan-19 | 20 | Box seine | 48 | 85 | 5 | 17 | Treatment pending | 2.40 | 4.25 | 0.25 | 0.85 |
| 380 | Sonora Pt., Noddes Channel | Y | | 7-Jan-19 | SP02 | Y | | 7-Jan-19 | 20 | Box seine | 43 | 76 | 9 | 15 | Treatment pending | 2.15 | 3.80 | 0.45 | 0.95 |
| 380 | Sonora Pt., Noddes Channel | Y | | 7-Jan-19 | SP10 | N | | 7-Jan-19 | 20 | Box seine | 30 | 46 | 17 | 15 | Treatment pending | 1.50 | 2.80 | 0.85 | 0.75 |
| 380 | Sonora Pt., Noddes Channel | Y | | 7-Jan-19 | SP04 | N | | 9-Jan-19 | 20 | Box seine | 29 | 47 | 29 | 11 | Treatment pending | 1.45 | 2.35 | 1.45 | 0.55 |
| 380 | Sonora Pt., Noddes Channel | Y | | 15-Jan-19 | SP01 | N | | 15-Jan-19 | 20 | Box seine | 92 | 150 | 6 | 0 | Treatment pending | 4.60 | 7.50 | 0.30 | 0.00 |

| Facility Reference No | Facility Name | Sampling Done This Month | If No Sampling, Explain | Sampling Event Start Date | Pen ID | Reference Pen | entry date | Pen Date | Number Sampled | Sampling Method | Adult Females L salmonids | Mottile L salmonids | Challimus | Mottile Caligus | Action Taken | Start Date (if fix or PC approval) | Comments | Items per fish | mol per fish | chal per fish | cal per fish |
|-----------------------|---|--------------------------|-------------------------|---------------------------|-------------|---------------|------------|-----------|----------------|-----------------|---------------------------|---------------------|-----------|-----------------|-------------------|------------------------------------|--|----------------|--------------|---------------|--------------|
| 380 | Sonora Pt., Nodules Channel | Y | | 15-Jan-19 | SP02 | Y | | 15-Jan-19 | 20 | Box seine | 56 | 89 | 3 | 0 | Treatment pending | | | 2.80 | 4.45 | 0.15 | 0.00 |
| 380 | Sonora Pt., Nodules Channel | Y | | 21-Jan-19 | SP02 | Y | | 21-Jan-19 | 20 | Box seine | 51 | 98 | 5 | 11 | Treatment ongoing | 21-Jan-19 | SLICE | 2.55 | 4.90 | 0.25 | 0.55 |
| 380 | Sonora Pt., Nodules Channel | Y | | 21-Jan-19 | SP05 | N | | 21-Jan-19 | 20 | Box seine | 66 | 105 | 9 | 36 | Treatment ongoing | 21-Jan-19 | SLICE | 3.30 | 5.25 | 0.45 | 1.80 |
| 380 | Sonora Pt., Nodules Channel | Y | | 21-Jan-19 | SP07 | N | | 21-Jan-19 | 20 | Box seine | 42 | 79 | 8 | 14 | Treatment ongoing | 21-Jan-19 | SLICE | 2.10 | 3.95 | 0.40 | 0.70 |
| 380 | Sonora Pt., Nodules Channel | Y | | 30-Jan-19 | SP02 | Y | | 30-Jan-19 | 20 | Box seine | 67 | 93 | 28 | 15 | None required | | | 3.35 | 4.65 | 1.40 | 0.75 |
| 380 | Sonora Pt., Nodules Channel | Y | | 30-Jan-19 | SP05 | N | | 30-Jan-19 | 20 | Box seine | 57 | 87 | 18 | 12 | None required | | | 2.85 | 4.35 | 0.90 | 0.60 |
| 380 | Sonora Pt., Nodules Channel | Y | | 30-Jan-19 | SP07 | N | | 30-Jan-19 | 20 | Box seine | 46 | 86 | 7 | 26 | None required | | | 2.30 | 4.30 | 0.35 | 1.30 |
| 388 | Brougham Point, East Thurlow Island | N | Fallow | | | | | | | | | | | | | | | | | | |
| 458 | Cypress Hrbr, Harbour Pt., Suttie Channel | Y | | 3-Jan-19 | 101 | Y | | 3-Jan-19 | 20 | Full seine | 3 | 3 | 7 | 23 | None required | | | 0.15 | 0.15 | 0.35 | 1.15 |
| 458 | Cypress Hrbr, Harbour Pt., Suttie Channel | Y | | 11-Jan-19 | 102 | N | | 11-Jan-19 | 20 | Full seine | 5 | 10 | 20 | 0 | None required | | | 0.25 | 0.50 | 1.00 | 0.00 |
| 458 | Cypress Hrbr, Harbour Pt., Suttie Channel | Y | | 16-Jan-19 | 106 | N | | 16-Jan-19 | 20 | Full seine | 9 | 16 | 11 | 2 | None required | | | 0.45 | 0.80 | 0.55 | 0.10 |
| 465 | Swanson Island, North side | Y | | 1-Jan-19 | SW09 | Y | | 1-Jan-19 | 20 | Box seine | 7 | 14 | 19 | 7 | Treatment pending | | | 0.35 | 0.70 | 0.95 | 0.35 |
| 465 | Swanson Island, North side | Y | | 1-Jan-19 | SW11 | N | | 1-Jan-19 | 20 | Box seine | 12 | 23 | 30 | 6 | Treatment pending | | | 0.60 | 1.15 | 1.50 | 0.30 |
| 465 | Swanson Island, North side | Y | | 5-Jan-19 | SW07 | N | | 5-Jan-19 | 20 | Box seine | 5 | 10 | 52 | 8 | Treatment pending | | Pen 9 is now standard pen as pen 3 was moved to Althorp | 0.25 | 0.50 | 2.60 | 0.40 |
| 465 | Swanson Island, North side | Y | | 5-Jan-19 | SW08 | N | | 5-Jan-19 | 20 | Box seine | 7 | 14 | 48 | 3 | Treatment pending | | | 0.35 | 0.70 | 2.40 | 0.15 |
| 465 | Swanson Island, North side | Y | | 5-Jan-19 | SW09 | Y | | 5-Jan-19 | 20 | Box seine | 3 | 12 | 29 | 4 | Treatment pending | | | 0.15 | 0.60 | 1.45 | 0.20 |
| 465 | Swanson Island, North side | Y | | 14-Jan-19 | SW09 | Y | | 14-Jan-19 | 20 | Box seine | 8 | 12 | 47 | 3 | Treatment pending | | | 0.40 | 0.60 | 2.35 | 0.15 |
| 465 | Swanson Island, North side | Y | | 14-Jan-19 | SW11 | N | | 14-Jan-19 | 20 | Box seine | 12 | 24 | 105 | 3 | Treatment pending | | | 0.60 | 1.20 | 5.25 | 0.15 |
| 465 | Swanson Island, North side | Y | | 22-Jan-19 | SW05 | N | | 22-Jan-19 | 20 | Box seine | 5 | 20 | 85 | 3 | Treatment pending | | | 0.25 | 1.00 | 4.25 | 0.15 |
| 465 | Swanson Island, North side | Y | | 22-Jan-19 | SW06 | N | | 22-Jan-19 | 20 | Box seine | 5 | 12 | 63 | 2 | Treatment pending | | | 0.25 | 0.60 | 3.15 | 0.10 |
| 465 | Swanson Island, North side | Y | | 22-Jan-19 | SW09 | Y | | 22-Jan-19 | 20 | Box seine | 6 | 12 | 88 | 25 | Treatment pending | | | 0.30 | 0.60 | 4.40 | 1.25 |
| 465 | Swanson Island, North side | Y | | 28-Jan-19 | SW09 | Y | | 28-Jan-19 | 20 | Box seine | 14 | 22 | 100 | 5 | Treatment pending | | | 0.70 | 1.10 | 5.00 | 0.25 |
| 465 | Swanson Island, North side | Y | | 28-Jan-19 | SW04 | N | | 28-Jan-19 | 20 | Box seine | 10 | 21 | 146 | 10 | Treatment pending | | | 0.50 | 1.05 | 7.90 | 0.50 |
| 466 | Arrow Passage, Bonwick Island | N | Fallow | | | | | | | | | | | | | | | | | | |
| 467 | Midsummer Island, Spring Passage | N | Fallow | | | | | | | | | | | | | | | | | | |
| 520 | Bedwell, East Shore | Y | | 20-Jan-19 | 102 | Y | | 20-Jan-19 | 20 | Full seine | 107 | 263 | 11 | 0 | Treatment pending | | | 5.35 | 13.15 | 0.55 | 0.00 |
| 520 | Bedwell, East Shore | Y | | 21-Jan-19 | 103 | N | | 21-Jan-19 | 20 | Full seine | 46 | 112 | 25 | 0 | Treatment pending | | | 2.30 | 5.60 | 1.25 | 0.00 |
| 520 | Bedwell, East Shore | Y | | 22-Jan-19 | 104 | N | | 22-Jan-19 | 20 | Full seine | 90 | 230 | 9 | 4 | Treatment pending | | | 4.50 | 11.50 | 0.45 | 0.20 |
| 543 | Muskel Rock, Clayoquot Sound | N | Fallow | | | | | | | | | | | | | | | | | | |
| 547 | Read Island, Bear Bay | N | Fallow | | | | | | | | | | | | | | | | | | |
| 553 | SE Frederick Arm | N | Fallow | | | | | | | | | | | | | | | | | | |
| 706 | Hardy Bay, Fort Hardy | N | Fallow | | | | | | | | | | | | | | | | | | |
| 728 | Sir Edmund Bay, NE Shore Broughton Inlet | Y | | 16-Jan-19 | 105 | N | | 16-Jan-19 | 20 | Full seine | 3 | 4 | 0 | 0 | None required | | | 0.15 | 0.20 | 0.00 | 0.00 |
| 728 | Sir Edmund Bay, NE Shore Broughton Inlet | Y | | 16-Jan-19 | 103 | N | | 16-Jan-19 | 20 | Full seine | 5 | 10 | 0 | 1 | None required | | | 0.25 | 0.50 | 0.00 | 0.05 |
| 728 | Sir Edmund Bay, NE Shore Broughton Inlet | Y | | 17-Jan-19 | 101 | Y | | 17-Jan-19 | 20 | Full seine | 4 | 13 | 0 | 11 | None required | | | 0.20 | 0.65 | 0.00 | 0.55 |
| 733 | Cyus Rocks, Osoyoos Channel | N | Fallow | | | | | | | | | | | | | | | | | | |
| 746 | Upper Retreat Passage | N | Fallow | | | | | | | | | | | | | | | | | | |
| 769 | Site 13, Sechart Inlet | N | Fallow | | | | | | | | | | | | | | | | | | |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 1-Jan-19 | CC02 | N | | 1-Jan-19 | 20 | Box seine | 30 | 85 | 7 | 0 | None required | | | 1.50 | 4.25 | 0.35 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 7-Jan-19 | CC01 | Y | | 7-Jan-19 | 20 | Box seine | 11 | 25 | 1 | 0 | None required | | | 0.55 | 1.15 | 0.05 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 7-Jan-19 | CC02 | N | | 7-Jan-19 | 20 | Box seine | 16 | 27 | 1 | 0 | None required | | | 0.80 | 1.35 | 0.05 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 7-Jan-19 | CC03 | N | | 7-Jan-19 | 20 | Box seine | 33 | 55 | 2 | 0 | None required | | | 1.65 | 2.75 | 0.10 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 10-Jan-19 | CC01 | Y | | 10-Jan-19 | 20 | Box seine | 14 | 31 | 0 | 0 | None required | | | 0.70 | 1.55 | 0.00 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 10-Jan-19 | CC02 | N | | 10-Jan-19 | 20 | Box seine | 6 | 21 | 12 | 5 | None required | | | 0.30 | 1.05 | 0.60 | 0.25 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 21-Jan-19 | CC01 | Y | | 21-Jan-19 | 20 | Box seine | 6 | 11 | 0 | 1 | None required | | | 0.80 | 0.55 | 0.00 | 0.05 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 21-Jan-19 | CC02 | N | | 21-Jan-19 | 20 | Box seine | 16 | 24 | 0 | 0 | None required | | | 0.80 | 1.20 | 0.00 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 21-Jan-19 | CC03 | N | | 21-Jan-19 | 20 | Box seine | 9 | 14 | 0 | 1 | None required | | | 0.45 | 0.70 | 0.00 | 0.05 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 28-Jan-19 | CC01 | Y | | 28-Jan-19 | 20 | Box seine | 4 | 5 | 0 | 0 | None required | | | 0.20 | 0.25 | 0.00 | 0.00 |
| 790 | Chancellor Channel, West Thurlow Island | Y | | 28-Jan-19 | CC05 | N | | 28-Jan-19 | 20 | Box seine | 3 | 7 | 1 | 1 | None required | | | 0.15 | 0.35 | 0.05 | 0.05 |
| 819 | Cecil Island, Greenway Sound | N | Fallow | | | | | | | | | | | | | | | | | | |
| 820 | Wicklow Point, Broughton Island | Y | | 6-Jan-19 | WP02 - pre | Y | | 6-Jan-19 | 20 | Box seine | 18 | 39 | 36 | 0 | Treatment pending | | | 0.90 | 1.95 | 1.80 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 6-Jan-19 | WP05 - pre | N | | 6-Jan-19 | 20 | Box seine | 10 | 20 | 40 | 0 | Treatment pending | | | 0.50 | 1.00 | 2.00 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 6-Jan-19 | WP04 - pre | N | | 6-Jan-19 | 20 | Box seine | 15 | 29 | 31 | 1 | Treatment pending | | | 0.75 | 1.45 | 1.55 | 0.05 |
| 820 | Wicklow Point, Broughton Island | Y | | 12-Jan-19 | WP02 - pre | N | | 12-Jan-19 | 20 | Box seine | 13 | 33 | 21 | 12 | Treatment pending | | | 0.65 | 1.65 | 1.05 | 0.60 |
| 820 | Wicklow Point, Broughton Island | Y | | 12-Jan-19 | WP06 - pre | N | | 12-Jan-19 | 20 | Box seine | 15 | 48 | 21 | 7 | Treatment pending | | | 0.75 | 2.40 | 1.05 | 0.35 |
| 820 | Wicklow Point, Broughton Island | Y | | 15-Jan-19 | WP03 - post | N | | 15-Jan-19 | 20 | Full seine | 9 | 31 | 15 | 4 | Treatment pending | | | 0.45 | 1.55 | 0.75 | 0.20 |
| 820 | Wicklow Point, Broughton Island | Y | | 15-Jan-19 | WP05 - post | N | | 15-Jan-19 | 40 | Other - explain | 6 | 8 | 12 | 1 | Treatment ongoing | 15-Jan-19 | Hydroliocer (3 pens still require treatment in early February). Pre hydroliocer counts | 0.15 | 0.20 | 0.30 | 0.03 |
| 820 | Wicklow Point, Broughton Island | Y | | 16-Jan-19 | WP05 - post | N | | 16-Jan-19 | 20 | Full seine | 16 | 26 | 17 | 0 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.80 | 1.30 | 0.85 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 16-Jan-19 | WP05 - post | N | | 16-Jan-19 | 60 | Other - explain | 16 | 20 | 8 | 2 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.27 | 0.33 | 0.13 | 0.03 |
| 820 | Wicklow Point, Broughton Island | Y | | 17-Jan-19 | WP07 - post | N | | 17-Jan-19 | 50 | Other - explain | 13 | 25 | 20 | 3 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.65 | 1.25 | 1.00 | 0.15 |
| 820 | Wicklow Point, Broughton Island | Y | | 17-Jan-19 | WP07 - post | N | | 17-Jan-19 | 50 | Other - explain | 6 | 9 | 12 | 1 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.12 | 0.18 | 0.24 | 0.02 |
| 820 | Wicklow Point, Broughton Island | Y | | 18-Jan-19 | WP09 - pre | N | | 18-Jan-19 | 40 | Other - explain | 8 | 31 | 17 | 1 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.40 | 1.55 | 0.85 | 0.05 |
| 820 | Wicklow Point, Broughton Island | Y | | 18-Jan-19 | WP09 - pre | N | | 18-Jan-19 | 40 | Other - explain | 9 | 12 | 18 | 0 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.23 | 0.30 | 0.40 | 0.05 |
| 820 | Wicklow Point, Broughton Island | Y | | 15-Jan-19 | WP11 - pre | N | | 15-Jan-19 | 20 | Full seine | 34 | 43 | 8 | 1 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 1.70 | 2.15 | 0.40 | 0.05 |
| 820 | Wicklow Point, Broughton Island | Y | | 16-Jan-19 | WP11 - post | N | | 16-Jan-19 | 50 | Other - explain | 19 | 20 | 3 | 0 | Treatment ongoing | 15-Jan-19 | Post hydroliocer counts | 0.38 | 0.40 | 0.06 | 0.00 |

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s.20(1)(b)

| Facility Reference No | Facility Name | Sampling Done This Month | If No Sampling, Explain | Sampling Event Start Date | Pen ID | Reference Pen | entry date | Pen Date | Number of Fish Sampled | Sampling Method | Adult Females L. salmonis | Motile L. salmonis | Challinus | Motile Caligus | Action Taken | Start Date (if Rx or PC approval) | Comments | Items per fish | mot. per fish | chal. per fish | cal. per fish |
|-----------------------|---|--------------------------|-------------------------|---------------------------|-------------|---------------|------------|-----------|------------------------|-----------------|---------------------------|--------------------|-----------|----------------|-------------------|-----------------------------------|------------------------|----------------|---------------|----------------|---------------|
| 820 | Wicklow Point, Broughton Island | Y | | 15-Jan-19 | WP12 - pre | N | | 20-Jan-19 | 20 | Full seine | 25 | 53 | 43 | 4 | Treatment ongoing | 15-Jan-19 | Pre hydrolyser counts | 1.25 | 2.65 | 2.15 | 0.20 |
| 820 | Wicklow Point, Broughton Island | Y | | 16-Jan-19 | WP12 - post | N | | 20-Jan-19 | 50 | Other - explain | 13 | 18 | 22 | 0 | Treatment ongoing | 15-Jan-19 | Post hydrolyser counts | 0.26 | 0.36 | 0.44 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 15-Jan-19 | WP10 - pre | N | | 21-Jan-19 | 20 | Full seine | 18 | 35 | 48 | 0 | Treatment ongoing | 15-Jan-19 | Pre hydrolyser counts | 0.90 | 1.75 | 2.40 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 16-Jan-19 | WP10 - post | N | | 21-Jan-19 | 50 | Other - explain | 12 | 12 | 23 | 0 | Treatment ongoing | 15-Jan-19 | Post hydrolyser counts | 0.24 | 0.24 | 0.46 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 15-Jan-19 | WP08 - pre | N | | 22-Jan-19 | 20 | Full seine | 14 | 27 | 31 | 0 | Treatment ongoing | 15-Jan-19 | Pre hydrolyser counts | 0.70 | 1.35 | 1.55 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 16-Jan-19 | WP08 - post | N | | 22-Jan-19 | 40 | Other - explain | 7 | 9 | 10 | 0 | Treatment ongoing | 15-Jan-19 | Post hydrolyser counts | 0.18 | 0.23 | 0.25 | 0.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 27-Jan-19 | WP02 - pre | Y | | 27-Jan-19 | 20 | Box seine | 18 | 43 | 40 | 20 | None required | | | 0.90 | 2.15 | 2.00 | 1.00 |
| 820 | Wicklow Point, Broughton Island | Y | | 27-Jan-19 | WP03 - post | N | | 27-Jan-19 | 20 | Box seine | 2 | 2 | 9 | 8 | None required | | | 0.10 | 0.10 | 0.45 | 0.40 |
| 821 | Glacial Falls, Watson Cove, Tribune Channel | N | Fallow | | | | | | | | | | | | | | | | | | |
| 831 | Shelter Passage, Whiahihi Island | Y | | 7-Jan-19 | SH03 | Y | | 7-Jan-19 | 20 | Box seine | 1 | 3 | 8 | 5 | None required | | | 0.05 | 0.15 | 0.40 | 0.25 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 7-Jan-19 | SH04 | N | | 7-Jan-19 | 20 | Box seine | 1 | 5 | 8 | 5 | None required | | | 0.05 | 0.25 | 0.40 | 0.25 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 7-Jan-19 | SH11 | N | | 7-Jan-19 | 20 | Box seine | 1 | 2 | 4 | 4 | None required | | | 0.05 | 0.10 | 0.20 | 0.20 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 14-Jan-19 | SH03 | Y | | 14-Jan-19 | 20 | Box seine | 1 | 2 | 2 | 0 | None required | | | 0.05 | 0.10 | 0.10 | 0.00 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 14-Jan-19 | SH07 | N | | 14-Jan-19 | 20 | Box seine | 0 | 0 | 2 | 0 | None required | | | 0.00 | 0.00 | 0.10 | 0.00 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 14-Jan-19 | SH09 | N | | 14-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 14-Jan-19 | SH02 | N | | 14-Jan-19 | 20 | Box seine | 1 | 4 | 4 | 1 | None required | | | 0.05 | 0.20 | 0.20 | 0.05 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 23-Jan-19 | SH03 | Y | | 23-Jan-19 | 20 | Box seine | 1 | 3 | 4 | 0 | None required | | | 0.05 | 0.15 | 0.20 | 0.00 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 23-Jan-19 | SH04 | N | | 23-Jan-19 | 20 | Box seine | 1 | 4 | 10 | 1 | None required | | | 0.05 | 0.20 | 0.50 | 0.05 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 27-Jan-19 | SH05 | N | | 27-Jan-19 | 20 | Box seine | 0 | 0 | 19 | 0 | None required | | | 0.00 | 0.00 | 0.95 | 0.00 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 27-Jan-19 | SH07 | N | | 27-Jan-19 | 20 | Box seine | 0 | 0 | 26 | 0 | None required | | | 0.00 | 0.00 | 1.30 | 0.00 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 27-Jan-19 | SH03 | Y | | 28-Jan-19 | 20 | Box seine | 0 | 0 | 26 | 0 | None required | | | 0.00 | 0.10 | 2.35 | 0.25 |
| 831 | Shelter Passage, Whiahihi Island | Y | | 27-Jan-19 | SH07 | N | | 28-Jan-19 | 20 | Full seine | 1 | 1 | 6 | 29 | None required | | | 0.10 | 0.10 | 0.35 | 2.30 |
| 869 | Maude Island, SE Broughton Is., | Y | | 16-Jan-19 | 110 | N | | 16-Jan-19 | 20 | Full seine | 2 | 2 | 7 | 46 | None required | | | 0.00 | 0.00 | 0.15 | 1.50 |
| 869 | Maude Island, SE Broughton Is., | Y | | 17-Jan-19 | 105 | Y | | 17-Jan-19 | 20 | Full seine | 2 | 2 | 7 | 46 | None required | | | 0.00 | 0.00 | 0.15 | 1.50 |
| 869 | Maude Island, SE Broughton Is., | Y | | 18-Jan-19 | 107 | N | | 18-Jan-19 | 20 | Full seine | 0 | 0 | 3 | 30 | None required | | | 0.00 | 0.05 | 0.00 | 0.00 |
| 871 | Barnes Bay, Sonora Island | Y | | 10-Jan-19 | 8 | Y | | 10-Jan-19 | 20 | Box seine | 0 | 1 | 0 | 0 | None required | | | 0.05 | 0.10 | 0.00 | 0.00 |
| 871 | Barnes Bay, Sonora Island | Y | | 10-Jan-19 | 11 | N | | 10-Jan-19 | 20 | Box seine | 0 | 2 | 0 | 0 | None required | | | 0.00 | 0.10 | 0.00 | 0.00 |
| 871 | Barnes Bay, Sonora Island | Y | | 10-Jan-19 | 12 | N | | 10-Jan-19 | 20 | Box seine | 0 | 2 | 0 | 0 | None required | | | 0.05 | 0.25 | 1.30 | 0.05 |
| 892 | Goltee Channel, S.E. Bell Island | Y | | 16-Jan-19 | B002 | N | | 16-Jan-19 | 20 | Box seine | 1 | 5 | 26 | 1 | None required | | | 0.00 | 0.10 | 1.40 | 0.00 |
| 892 | Goltee Channel, S.E. Bell Island | Y | | 16-Jan-19 | B004 | Y | | 16-Jan-19 | 20 | Box seine | 0 | 2 | 28 | 0 | None required | | | 0.00 | 0.05 | 0.80 | 0.05 |
| 892 | Goltee Channel, S.E. Bell Island | Y | | 23-Jan-19 | B002 | N | | 23-Jan-19 | 20 | Box seine | 0 | 1 | 16 | 1 | None required | | | 0.05 | 0.10 | 0.70 | 0.10 |
| 892 | Goltee Channel, S.E. Bell Island | Y | | 23-Jan-19 | B004 | Y | | 23-Jan-19 | 20 | Box seine | 1 | 2 | 14 | 2 | None required | | | 0.35 | 0.80 | 0.50 | 0.00 |
| 892 | Goltee Channel, S.E. Bell Island | Y | | 30-Jan-19 | B002 | N | | 30-Jan-19 | 20 | Box seine | 7 | 16 | 6 | 0 | None required | | | 0.35 | 0.65 | 0.50 | 0.00 |
| 892 | Goltee Channel, S.E. Bell Island | Y | | 30-Jan-19 | B004 | Y | | 30-Jan-19 | 20 | Box seine | 7 | 13 | 10 | 0 | None required | | | 0.35 | 0.65 | 0.50 | 0.00 |
| 1059 | Sargent Passage, Tribune Channel | N | Recent transfer | | | | | | | | | | | | | | | | | | |
| 1079 | Steamer Point, Hecla Channel | Y | | 12-Jan-19 | 13 | N | | 12-Jan-19 | 20 | Box seine | 5 | 8 | 2 | 0 | | | | 0.35 | 0.40 | 0.10 | 0.00 |
| 1079 | Steamer Point, Hecla Channel | Y | | 13-Jan-19 | 5 | Y | | 13-Jan-19 | 20 | Box seine | 11 | 13 | 0 | 0 | | | | 0.55 | 0.65 | 0.00 | 0.00 |
| 1079 | Steamer Point, Hecla Channel | Y | | 13-Jan-19 | 11 | N | | 13-Jan-19 | 20 | Box seine | 13 | 15 | 1 | 0 | | | | 0.55 | 0.75 | 0.05 | 0.70 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 10-Jan-19 | 5004 | N | | 10-Jan-19 | 20 | Box seine | 0 | 0 | 37 | 14 | None required | | | 0.80 | 0.00 | 1.85 | 0.70 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 10-Jan-19 | 5008 | N | | 10-Jan-19 | 20 | Box seine | 16 | 34 | 23 | 4 | None required | | | 0.80 | 1.70 | 0.75 | 0.20 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 10-Jan-19 | 5012 | N | | 10-Jan-19 | 20 | Box seine | 2 | 8 | 68 | 10 | None required | | | 0.10 | 0.40 | 3.40 | 0.50 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 10-Jan-19 | 5016 | N | | 10-Jan-19 | 20 | Box seine | 3 | 5 | 57 | 8 | None required | | | 0.15 | 0.25 | 2.85 | 0.40 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 10-Jan-19 | 5004 | N | | 10-Jan-19 | 20 | Box seine | 1 | 19 | 15 | 2 | None required | | | 0.05 | 0.95 | 0.80 | 0.10 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 20-Jan-19 | 5008 | N | | 20-Jan-19 | 20 | Box seine | 1 | 25 | 25 | 2 | None required | | | 0.05 | 1.15 | 1.25 | 0.10 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 20-Jan-19 | 5004 | N | | 20-Jan-19 | 20 | Box seine | 17 | 40 | 40 | 2 | None required | | | 0.85 | 2.00 | 2.00 | 0.10 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 26-Jan-19 | 5004 | N | | 26-Jan-19 | 20 | Box seine | 9 | 37 | 48 | 1 | None required | | | 0.45 | 1.85 | 2.40 | 0.10 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 26-Jan-19 | 5012 | N | | 26-Jan-19 | 20 | Box seine | 11 | 29 | 63 | 1 | None required | | | 0.55 | 1.45 | 3.15 | 0.05 |
| 1136 | Shaw Point, Sunderfand Channel | Y | | 26-Jan-19 | 5016 | N | | 26-Jan-19 | 20 | Box seine | 11 | 30 | 22 | 40 | None required | | | 0.55 | 1.50 | 1.10 | 2.00 |
| 1144 | Birdwood Group, Raleigh Passage | Y | | 16-Jan-19 | 102 | N | | 16-Jan-19 | 20 | Full seine | 7 | 29 | 36 | 21 | None required | | | 0.35 | 1.45 | 1.80 | 1.05 |
| 1144 | Birdwood Group, Raleigh Passage | Y | | 15-Jan-19 | 106 | N | | 15-Jan-19 | 20 | Full seine | 7 | 29 | 36 | 21 | None required | | | 0.35 | 1.45 | 1.80 | 1.05 |
| 1144 | Birdwood Group, Raleigh Passage | Y | | 15-Jan-19 | 108 | N | | 15-Jan-19 | 20 | Full seine | 5 | 26 | 18 | 58 | None required | | | 0.25 | 1.30 | 0.90 | 2.90 |
| 1145 | Potts Bay, Midsummer Island | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1145 | Brins Island, Herbert Inlet | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1158 | Holme South Point, Prince Channel | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1164 | Farside, NW side Frederick Arm | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1167 | Egerton Creek, Frederick Arm | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1198 | Raynor Group, Vang Island | N | Recent transfer | | | | | | | | | | | | | | | | | | |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 3-Jan-19 | MR01 | Y | | 3-Jan-19 | 20 | Box seine | 0 | 0 | 6 | 1 | None required | | | 0.00 | 0.00 | 0.30 | 0.05 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 3-Jan-19 | MR03 | N | | 3-Jan-19 | 20 | Box seine | 0 | 0 | 2 | 0 | None required | | | 0.00 | 0.00 | 0.10 | 0.00 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 9-Jan-19 | MR04 | N | | 9-Jan-19 | 20 | Box seine | 0 | 3 | 6 | 2 | None required | | | 0.00 | 0.15 | 0.30 | 0.10 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 9-Jan-19 | MR01 | Y | | 10-Jan-19 | 20 | Box seine | 1 | 2 | 6 | 1 | None required | | | 0.05 | 0.10 | 0.30 | 0.05 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 9-Jan-19 | MR05 | N | | 10-Jan-19 | 20 | Box seine | 1 | 2 | 6 | 1 | None required | | | 0.05 | 0.10 | 0.30 | 0.05 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 17-Jan-19 | MR01 | Y | | 17-Jan-19 | 20 | Box seine | 0 | 4 | 2 | 0 | None required | | | 0.00 | 0.20 | 0.10 | 0.00 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 17-Jan-19 | MR06 | N | | 17-Jan-19 | 20 | Box seine | 0 | 2 | 2 | 1 | None required | | | 0.00 | 0.10 | 0.10 | 0.05 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 24-Jan-19 | MR01 | Y | | 24-Jan-19 | 20 | Box seine | 1 | 3 | 2 | 3 | None required | | | 0.05 | 0.15 | 0.10 | 0.15 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 24-Jan-19 | MR07 | N | | 24-Jan-19 | 20 | Box seine | 1 | 4 | 2 | 6 | None required | | | 0.05 | 0.20 | 0.10 | 0.30 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 24-Jan-19 | MR08 | N | | 25-Jan-19 | 20 | Box seine | 1 | 1 | 4 | 3 | None required | | | 0.05 | 0.05 | 0.20 | 0.15 |
| 1237 | Monday Rocks, Quatsino Sound | Y | | 30-Jan-19 | MR01 | Y | | 30-Jan-19 | 20 | Box seine | 0 | 2 | 5 | 2 | None required | | | 0.00 | 0.10 | 0.25 | 0.10 |

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| Facility Reference No | Facility Name | Sampling Done This Month | If No Sampling, Explain | Sampling Event Start Date | Pen ID | Reference Pen | entry date | Pen Sample Date | Number of Fish Sampled | Sampling Method | Adult Females L. salmonis | Mottile L. salmonis | Chalimus | Mottile Caligus | Action Taken | Start Date (if Rx or PC approval) | Comments | tenis_perfi sh | mol_perfi sh | chal_perfi sh | cal_perfi sh |
|-----------------------|---|--------------------------|-------------------------|---------------------------|--------|---------------|------------|-----------------|------------------------|-----------------|---------------------------|---------------------|----------|-----------------|-------------------|-----------------------------------|----------|----------------|--------------|---------------|--------------|
| 1237 | Munday Rocks, Quatsino Sound | Y | | 30-Jan-19 | MR09 | N | | 30-Jan-19 | 20 | Box seine | 0 | 1 | 3 | 3 | None required | | | 0.00 | 0.05 | 0.15 | |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 3-Jan-19 | MW04 | Y | | 3-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 3-Jan-19 | MW05 | N | | 3-Jan-19 | 20 | Box seine | 0 | 0 | 2 | 0 | None required | | | 0.00 | 0.00 | 0.10 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 8-Jan-19 | MW04 | Y | | 8-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 8-Jan-19 | MW08 | N | | 8-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 8-Jan-19 | MW09 | N | | 8-Jan-19 | 20 | Box seine | 0 | 0 | 2 | 0 | None required | | | 0.00 | 0.00 | 0.10 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 16-Jan-19 | MW04 | Y | | 16-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 16-Jan-19 | MW10 | N | | 16-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 23-Jan-19 | MW01 | N | | 23-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 23-Jan-19 | MW02 | N | | 23-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 23-Jan-19 | MW04 | Y | | 23-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | None required | | | 0.00 | 0.00 | 0.05 | 0.00 |
| 1238 | Mihatta West, Koskimo Islands, Quatsino Sound | Y | | 12-Jan-19 | DO05 | N | | 12-Jan-19 | 20 | Box seine | 15 | 29 | 7 | 9 | Treatment pending | | | 0.75 | 1.45 | 0.35 | 0.40 |
| 1238 | Doyle Island, Gordon Group | Y | | 12-Jan-19 | DO08 | N | | 12-Jan-19 | 20 | Box seine | 10 | 20 | 7 | 8 | Treatment pending | | | 0.50 | 1.00 | 0.35 | 0.40 |
| 1238 | Doyle Island, Gordon Group | Y | | 16-Jan-19 | DO01 | N | | 16-Jan-19 | 20 | Box seine | 7 | 18 | 34 | 6 | Treatment pending | | | 0.35 | 0.90 | 1.70 | 0.30 |
| 1238 | Doyle Island, Gordon Group | Y | | 16-Jan-19 | DO02 | Y | | 16-Jan-19 | 20 | Box seine | 8 | 28 | 55 | 0 | Treatment pending | | | 0.40 | 1.40 | 2.75 | 0.00 |
| 1238 | Doyle Island, Gordon Group | Y | | 16-Jan-19 | DO04 | N | | 16-Jan-19 | 20 | Box seine | 15 | 38 | 33 | 7 | Treatment pending | | | 0.75 | 1.90 | 1.65 | 0.35 |
| 1238 | Doyle Island, Gordon Group | Y | | 30-Jan-19 | DO06 | N | | 30-Jan-19 | 20 | Box seine | 7 | 32 | 39 | 13 | Treatment pending | | | 0.35 | 1.60 | 1.95 | 0.65 |
| 1291 | McIntyre Lake, Bedwell Sound | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1293 | Duncan Island, Goletas Channel | Y | | 16-Jan-19 | DU02 | Y | | 16-Jan-19 | 20 | Dipnet-feed | 16 | 33 | 24 | 7 | Treatment pending | | | 0.80 | 1.65 | 1.20 | 0.35 |
| 1293 | Duncan Island, Goletas Channel | Y | | 23-Jan-19 | DU02 | Y | | 23-Jan-19 | 20 | Dipnet-feed | 6 | 9 | 6 | 4 | Treatment pending | | | 0.30 | 0.45 | 0.30 | 0.20 |
| 1293 | Duncan Island, Goletas Channel | Y | | 23-Jan-19 | DU07 | N | | 23-Jan-19 | 20 | Dipnet-feed | 9 | 22 | 9 | 3 | Treatment pending | | | 0.45 | 1.10 | 0.45 | 0.15 |
| 1293 | Duncan Island, Goletas Channel | Y | | 23-Jan-19 | DU08 | N | | 23-Jan-19 | 20 | Dipnet-feed | 8 | 21 | 8 | 1 | Treatment pending | | | 0.40 | 1.05 | 0.40 | 0.05 |
| 1293 | Duncan Island, Goletas Channel | Y | | 30-Jan-19 | DU02 | Y | | 30-Jan-19 | 20 | Dipnet-feed | 13 | 18 | 4 | 4 | Treatment pending | | | 0.65 | 0.90 | 0.20 | 0.20 |
| 1293 | Duncan Island, Goletas Channel | Y | | 30-Jan-19 | DU10 | N | | 30-Jan-19 | 20 | Dipnet-feed | 0 | 6 | 29 | 5 | Treatment pending | | | 0.00 | 0.30 | 1.45 | 0.25 |
| 1293 | Duncan Island, Goletas Channel | Y | | 30-Jan-19 | DU11 | N | | 30-Jan-19 | 20 | Dipnet-feed | 1 | 4 | 12 | 1 | Treatment pending | | | 0.05 | 0.20 | 0.60 | 0.05 |
| 1299 | Thorpe Point, Holberg Inlet | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1300 | Althorpe, Sunderland Channel | Y | | 7-Jan-19 | AP01 | Y | | 7-Jan-19 | 20 | Box seine | 2 | 12 | 39 | 0 | Treatment pending | | | 0.10 | 0.60 | 1.95 | 0.00 |
| 1300 | Althorpe, Sunderland Channel | Y | | 7-Jan-19 | AP04 | N | | 7-Jan-19 | 20 | Box seine | 4 | 19 | 24 | 71 | Treatment pending | | | 0.20 | 0.95 | 1.20 | 0.55 |
| 1300 | Althorpe, Sunderland Channel | Y | | 7-Jan-19 | AP06 | N | | 7-Jan-19 | 20 | Box seine | 2 | 17 | 24 | 33 | Treatment pending | | | 0.10 | 0.65 | 1.60 | 0.50 |
| 1300 | Althorpe, Sunderland Channel | Y | | 14-Jan-19 | AP03 | N | | 14-Jan-19 | 20 | Box seine | 1 | 12 | 0 | 6 | Treatment pending | | | 0.20 | 0.60 | 0.80 | 0.30 |
| 1300 | Althorpe, Sunderland Channel | Y | | 14-Jan-19 | AP05 | N | | 14-Jan-19 | 20 | Box seine | 4 | 51 | 0 | 45 | Treatment pending | | | 0.20 | 2.55 | 0.00 | 0.30 |
| 1300 | Althorpe, Sunderland Channel | Y | | 20-Jan-19 | AP01 | Y | | 20-Jan-19 | 20 | Box seine | 8 | 77 | 82 | 56 | Treatment pending | | | 0.40 | 1.35 | 4.10 | 7.25 |
| 1300 | Althorpe, Sunderland Channel | Y | | 20-Jan-19 | AP02 | N | | 20-Jan-19 | 20 | Box seine | 8 | 74 | 82 | 56 | Treatment pending | | | 0.40 | 1.35 | 4.10 | 7.25 |
| 1300 | Althorpe, Sunderland Channel | Y | | 20-Jan-19 | AP02 | N | | 20-Jan-19 | 20 | Box seine | 8 | 74 | 82 | 56 | Treatment pending | | | 0.40 | 1.35 | 4.10 | 7.25 |
| 1300 | Althorpe, Sunderland Channel | Y | | 20-Jan-19 | AP04 | N | | 20-Jan-19 | 20 | Box seine | 8 | 45 | 33 | 30 | Treatment pending | | | 0.40 | 2.70 | 2.65 | 2.75 |
| 1300 | Althorpe, Sunderland Channel | Y | | 25-Jan-19 | AP04 | N | | 25-Jan-19 | 20 | Box seine | 2 | 21 | 37 | 77 | Treatment pending | | | 0.00 | 1.05 | 3.85 | 3.85 |
| 1300 | Althorpe, Sunderland Channel | Y | | 25-Jan-19 | AP05 | N | | 25-Jan-19 | 20 | Box seine | 2 | 8 | 28 | 72 | Treatment pending | | | 0.10 | 0.40 | 1.45 | 3.60 |
| 1300 | Althorpe, Sunderland Channel | Y | | 25-Jan-19 | AP06 | N | | 25-Jan-19 | 20 | Box seine | 1 | 16 | 36 | 62 | Treatment pending | | | 0.05 | 0.80 | 1.80 | 3.10 |
| 1335 | Welsh Bay, Wells Passage | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1336 | Simmonds Bay, Wells Passage | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1338 | Mihatta East, Quatsino Sound | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1350 | Shelter Bay, Richards Channel | Y | | 4-Jan-19 | 5803 | N | | 4-Jan-19 | 20 | Box seine | 0 | 3 | 5 | 6 | None required | | | 0.00 | 0.15 | 0.25 | 0.30 |
| 1350 | Shelter Bay, Richards Channel | Y | | 4-Jan-19 | 5804 | Y | | 4-Jan-19 | 20 | Box seine | 1 | 3 | 1 | 5 | None required | | | 0.05 | 0.15 | 0.05 | 0.25 |
| 1350 | Shelter Bay, Richards Channel | Y | | 4-Jan-19 | 5805 | N | | 4-Jan-19 | 20 | Box seine | 2 | 8 | 6 | 2 | None required | | | 0.10 | 0.40 | 0.30 | 0.10 |
| 1350 | Shelter Bay, Richards Channel | Y | | 11-Jan-19 | 5806 | N | | 11-Jan-19 | 20 | Box seine | 4 | 10 | 1 | 4 | None required | | | 0.20 | 0.50 | 0.05 | 0.20 |
| 1350 | Shelter Bay, Richards Channel | Y | | 11-Jan-19 | 5807 | N | | 11-Jan-19 | 20 | Box seine | 4 | 9 | 5 | 3 | None required | | | 0.20 | 0.45 | 0.25 | 0.15 |
| 1350 | Shelter Bay, Richards Channel | Y | | 15-Jan-19 | 5808 | N | | 15-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1350 | Shelter Bay, Richards Channel | Y | | 15-Jan-19 | 5804 | N | | 15-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1350 | Shelter Bay, Richards Channel | Y | | 15-Jan-19 | 5810 | N | | 15-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1350 | Shelter Bay, Richards Channel | Y | | 21-Jan-19 | 5804 | Y | | 21-Jan-19 | 20 | Box seine | 3 | 13 | 0 | 2 | None required | | | 0.15 | 0.65 | 0.00 | 0.10 |
| 1350 | Shelter Bay, Richards Channel | Y | | 21-Jan-19 | 5806 | N | | 21-Jan-19 | 20 | Box seine | 0 | 14 | 13 | 4 | None required | | | 0.00 | 0.70 | 0.65 | 0.20 |
| 1350 | Shelter Bay, Richards Channel | Y | | 29-Jan-19 | 5801 | N | | 29-Jan-19 | 20 | Box seine | 1 | 3 | 9 | 0 | None required | | | 0.05 | 0.15 | 0.45 | 0.00 |
| 1350 | Shelter Bay, Richards Channel | Y | | 29-Jan-19 | 5804 | Y | | 29-Jan-19 | 20 | Box seine | 0 | 0 | 2 | 0 | None required | | | 0.00 | 0.00 | 0.10 | 0.00 |
| 1350 | Shelter Bay, Richards Channel | Y | | 29-Jan-19 | 5809 | N | | 29-Jan-19 | 20 | Box seine | 0 | 0 | 2 | 0 | None required | | | 0.00 | 0.05 | 0.45 | 0.00 |
| 1350 | Shelter Bay, Richards Channel | Y | | 4-Jan-19 | MR04 | Y | | 4-Jan-19 | 20 | Box seine | 0 | 1 | 9 | 0 | None required | | | 0.00 | 0.05 | 0.45 | 0.00 |
| 1351 | Marsh Bay, Stuart Rock N. of P. Hardy | Y | | 4-Jan-19 | MR05 | N | | 4-Jan-19 | 20 | Box seine | 0 | 1 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1351 | Marsh Bay, Stuart Rock N. of P. Hardy | Y | | 4-Jan-19 | MR06 | N | | 4-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1351 | Marsh Bay, Stuart Rock N. of P. Hardy | Y | | 4-Jan-19 | MR08 | N | | 4-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | None required | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1351 | Marsh Bay, Stuart Rock N. of P. Hardy | Y | | 24-Jan-19 | MR03 | N | | 24-Jan-19 | 20 | Box seine | 0 | 3 | 18 | 5 | None required | | | 0.00 | 0.15 | 0.90 | 0.25 |
| 1351 | Marsh Bay, Stuart Rock N. of P. Hardy | Y | | 24-Jan-19 | MR04 | Y | | 24-Jan-19 | 20 | Box seine | 0 | 3 | 10 | 11 | None required | | | 0.00 | 0.15 | 0.50 | 0.55 |
| 1351 | Marsh Bay, Stuart Rock N. of P. Hardy | Y | | 24-Jan-19 | MR08 | N | | 24-Jan-19 | 20 | Box seine | 0 | 1 | 23 | 4 | None required | | | 0.00 | 0.05 | 1.15 | 0.20 |
| 1376 | Chaggy Creek, Quatsino Sound | N | Fallow | | | | | | | | | | | | | | | | | | |
| 1382 | Robertson Island, Richards Channel | Y | | 20-Jan-19 | R002 | N | | 20-Jan-19 | 20 | Box seine | 65 | 85 | 46 | 29 | Treatment pending | | | 3.25 | 4.25 | 2.30 | 1.45 |
| 1382 | Robertson Island, Richards Channel | Y | | 20-Jan-19 | R004 | Y | | 20-Jan-19 | 20 | Box seine | 36 | 67 | 67 | 25 | Treatment pending | | | 1.80 | 3.35 | 3.35 | 1.25 |
| 1382 | Robertson Island, Richards Channel | Y | | 20-Jan-19 | R006 | N | | 20-Jan-19 | 20 | Box seine | 39 | 59 | 31 | 25 | Treatment pending | | | 1.95 | 2.95 | 1.55 | 1.25 |
| 1382 | Robertson Island, Richards Channel | Y | | 25-Jan-19 | R003 | N | | 25-Jan-19 | 20 | Box seine | 47 | 69 | 84 | 27 | Treatment pending | | | 2.35 | 3.45 | 4.20 | 1.35 |
| 1382 | Robertson Island, Richards Channel | Y | | 25-Jan-19 | R004 | Y | | 25-Jan-19 | 20 | Box seine | 59 | 98 | 73 | 35 | Treatment pending | | | 2.95 | 4.90 | 3.65 | 1.75 |
| 1382 | Robertson Island, Richards Channel | Y | | 25-Jan-19 | R005 | N | | 25-Jan-19 | 20 | Box seine | 48 | 94 | 59 | 30 | Treatment pending | | | 2.40 | 4.70 | 2.95 | 1.50 |

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| Facility Reference No | Facility Name | Sampling Done This Month | If No Sampling, Explain | Sampling Event Start Date | Pen ID | Reference Pen | entry date | Pen Sample Date | Number of Fish Sampled | Adult Females L | Motile L salmonids | Challium | Motile Caligus | Action Taken | Start Date (if Rx or PC approval) | Comments | Items per sh | mol per sh | chal per sh | perf sh |
|-----------------------|--|--------------------------|-------------------------|---------------------------|--------|---------------|------------|-----------------|------------------------|-----------------|--------------------|----------|----------------|--------------|-----------------------------------|------------------------------------|--------------|------------|-------------|---------|
| 1401 | Brent Island, Osoyoos Channel | Y | | 5-Jan-19 | 106 | N | | 5-Jan-19 | 20 | Full seine | 2 | 4 | 0 | 4 | None required | | 0.10 | 0.20 | 0.00 | 0.20 |
| 1401 | Brent Island, Osoyoos Channel | Y | | 5-Jan-19 | 105 | N | | 5-Jan-19 | 20 | Full seine | 2 | 4 | 0 | 3 | None required | | 0.10 | 0.20 | 0.00 | 0.15 |
| 1401 | Brent Island, Osoyoos Channel | Y | | 5-Jan-19 | 103 | Y | | 5-Jan-19 | 20 | Full seine | 3 | 7 | 0 | 3 | None required | | 0.15 | 0.35 | 0.00 | 0.15 |
| 1507 | Miller Channel, 2km S Hayden Passage | Y | | 4-Jan-19 | 108 | Y | | 4-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 0 | None required | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1507 | Miller Channel, 2km S Hayden Passage | Y | | 4-Jan-19 | 102 | Y | | 4-Jan-19 | 20 | Full seine | 0 | 0 | 0 | 2 | None required | | 0.00 | 0.00 | 0.00 | 0.10 |
| 1507 | Miller Channel, 2km S Hayden Passage | Y | | 5-Jan-19 | 109 | N | | 5-Jan-19 | 20 | Full seine | 0 | 1 | 0 | 3 | None required | | 0.00 | 0.05 | 0.00 | 0.15 |
| 1537 | Bare Bluff, Clayoquot Srd, Bedwell Srd | Y | | 19-Jan-19 | 106 | N | | 19-Jan-19 | 20 | Full seine | 105 | 198 | 0 | 0 | Treatment ongoing | 31-Jan-19 | 5.25 | 9.90 | 0.00 | 0.00 |
| 1537 | Bare Bluff, Clayoquot Srd, Bedwell Srd | Y | | 19-Jan-19 | 103 | N | | 19-Jan-19 | 20 | Full seine | 99 | 160 | 0 | 1 | Treatment ongoing | 31-Jan-19 | 4.95 | 8.00 | 0.00 | 0.05 |
| 1537 | Bare Bluff, Clayoquot Srd, Bedwell Srd | Y | | 20-Jan-19 | 105 | Y | | 20-Jan-19 | 20 | Full seine | 84 | 181 | 2 | 0 | Treatment ongoing | 31-Jan-19 | 4.20 | 9.05 | 0.10 | 0.00 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 7-Jan-19 | HW01 | Y | | 7-Jan-19 | 20 | Box seine | 18 | 33 | 16 | 5 | Treatment pending | | 0.90 | 1.65 | 0.80 | 0.25 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 7-Jan-19 | HW02 | N | | 7-Jan-19 | 20 | Box seine | 1 | 9 | 42 | 18 | Treatment pending | | 0.05 | 0.45 | 2.10 | 0.90 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 12-Jan-19 | HW01 | Y | | 12-Jan-19 | 20 | Box seine | 13 | 51 | 30 | 26 | Treatment pending | | 0.65 | 2.55 | 1.50 | 3.30 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 12-Jan-19 | HW02 | N | | 12-Jan-19 | 20 | Box seine | 0 | 8 | 62 | 61 | Treatment pending | | 0.00 | 0.40 | 3.10 | 3.05 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 12-Jan-19 | HW04 | N | | 12-Jan-19 | 20 | Box seine | 13 | 35 | 42 | 57 | Treatment pending | | 0.65 | 1.75 | 2.10 | 2.85 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 21-Jan-19 | HW01 | Y | | 21-Jan-19 | 20 | Box seine | 12 | 31 | 28 | 15 | Treatment pending | | 0.60 | 1.55 | 1.40 | 0.75 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 21-Jan-19 | HW06 | N | | 21-Jan-19 | 20 | Box seine | 1 | 13 | 30 | 21 | Treatment pending | | 0.05 | 0.65 | 1.50 | 1.05 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 25-Jan-19 | HW01 | Y | | 25-Jan-19 | 20 | Box seine | 16 | 66 | 35 | 52 | Treatment pending | | 0.80 | 3.30 | 0.75 | 2.60 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 25-Jan-19 | HW09 | N | | 25-Jan-19 | 20 | Box seine | 19 | 88 | 212 | 112 | Treatment pending | | 0.95 | 4.40 | 10.60 | 5.60 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 25-Jan-19 | HW07 | N | | 25-Jan-19 | 21 | Box seine | 30 | 64 | 71 | 67 | Treatment pending | | 1.43 | 3.05 | 3.38 | 3.19 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 29-Jan-19 | HW03 | N | | 29-Jan-19 | 20 | Box seine | 19 | 50 | 34 | 62 | Treatment pending | | 0.95 | 2.50 | 1.70 | 3.10 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 29-Jan-19 | HW05 | N | | 29-Jan-19 | 20 | Box seine | 24 | 66 | 26 | 37 | Treatment pending | | 1.20 | 3.30 | 1.30 | 1.85 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 29-Jan-19 | HW08 | N | | 29-Jan-19 | 20 | Box seine | 7 | 75 | 66 | 65 | Treatment pending | | 0.35 | 3.75 | 3.30 | 3.25 |
| 1581 | Hardwicke Is. Site B, Chancellor Channel | Y | | 29-Jan-19 | HW06 | N | | 29-Jan-19 | 20 | Box seine | 8 | 80 | 71 | 73 | Treatment pending | | 0.40 | 4.00 | 3.55 | 3.65 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 7-Jan-19 | D101 | Y | | 7-Jan-19 | 20 | Box seine | 5 | 14 | 114 | 106 | Treatment pending | | 0.25 | 0.70 | 5.70 | 5.30 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 7-Jan-19 | D103 | N | | 7-Jan-19 | 20 | Box seine | 1 | 3 | 79 | 77 | Treatment pending | | 0.05 | 0.15 | 3.95 | 3.85 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 7-Jan-19 | D104 | N | | 7-Jan-19 | 20 | Box seine | 2 | 13 | 85 | 80 | Treatment pending | | 0.10 | 0.65 | 4.25 | 4.00 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 14-Jan-19 | D101 | Y | | 14-Jan-19 | 20 | Box seine | 4 | 17 | 228 | 11 | Treatment pending | | 0.20 | 0.85 | 11.40 | 0.55 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 14-Jan-19 | D102 | Y | | 14-Jan-19 | 20 | Box seine | 4 | 12 | 181 | 15 | Treatment pending | | 0.20 | 0.60 | 9.05 | 0.75 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 21-Jan-19 | D101 | Y | | 21-Jan-19 | 20 | Box seine | 4 | 10 | 172 | 116 | Treatment pending | | 0.20 | 0.50 | 8.60 | 5.80 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 21-Jan-19 | D102 | N | | 21-Jan-19 | 20 | Box seine | 1 | 16 | 133 | 78 | Treatment pending | | 0.05 | 0.80 | 6.65 | 3.30 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 21-Jan-19 | D107 | N | | 21-Jan-19 | 20 | Box seine | 8 | 15 | 225 | 73 | Treatment pending | | 0.40 | 0.75 | 11.25 | 3.65 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 21-Jan-19 | D108 | N | | 21-Jan-19 | 20 | Box seine | 4 | 8 | 285 | 21 | Treatment pending | | 0.20 | 0.40 | 14.25 | 1.05 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 29-Jan-19 | D101 | Y | | 29-Jan-19 | 20 | Box seine | 5 | 12 | 909 | 56 | Treatment pending | | 0.25 | 0.60 | 15.15 | 2.80 |
| 1586 | Doctor Islets, Knight Inlet | Y | | 29-Jan-19 | D105 | N | | 29-Jan-19 | 20 | Box seine | 5 | 12 | 123 | 88 | Treatment pending | | 0.25 | 0.60 | 6.15 | 4.40 |
| 1618 | Humphrey Rock, Tribune Channel | N | Harvest ongoing | | | | | | | | | | | | Follow as of January 9, 2019 | | | | | |
| 1691 | Kid Bay, Roderick Island | Y | | 12-Jan-19 | K801 | N | | 13-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 3 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.15 |
| 1691 | Kid Bay, Roderick Island | Y | | 6-Jan-19 | K801 | pre | | 6-Jan-19 | 20 | Box seine | 16 | 34 | 6 | 10 | Treatment ongoing | 29-Dec-18 | 0.80 | 1.70 | 0.30 | 0.50 |
| 1691 | Kid Bay, Roderick Island | Y | | 9-Jan-19 | K802 | N | | 9-Jan-19 | 20 | Box seine | 0 | 1 | 0 | 0 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.05 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 5-Jan-19 | K802 | pre | | 5-Jan-19 | 20 | Box seine | 7 | 17 | 5 | 16 | Treatment ongoing | 29-Dec-18 | 0.35 | 0.85 | 0.25 | 0.80 |
| 1691 | Kid Bay, Roderick Island | Y | | 9-Jan-19 | K803 | pre | | 9-Jan-19 | 20 | Box seine | 11 | 24 | 9 | 3 | Treatment ongoing | 29-Dec-18 | 0.55 | 1.20 | 0.45 | 0.05 |
| 1691 | Kid Bay, Roderick Island | Y | | 6-Jan-19 | K804 | N | | 6-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 3 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.15 |
| 1691 | Kid Bay, Roderick Island | Y | | 2-Jan-19 | K804 | pre | | 2-Jan-19 | 20 | Box seine | 3 | 26 | 3 | 0 | Treatment ongoing | 29-Dec-18 | 0.85 | 1.30 | 0.15 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 16-Jan-19 | K805 | Y | | 16-Jan-19 | 20 | Box seine | 2 | 2 | 2 | 0 | Treatment ongoing | 29-Dec-18 | 0.10 | 0.10 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 23-Jan-19 | K805 | N | | 26-Jan-19 | 20 | Box seine | 0 | 2 | 0 | 2 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.05 | 0.30 | 0.10 |
| 1691 | Kid Bay, Roderick Island | Y | | 9-Jan-19 | K805 | pre | | 9-Jan-19 | 20 | Box seine | 11 | 21 | 4 | 6 | Treatment ongoing | 29-Dec-18 | 0.55 | 1.00 | 0.20 | 0.30 |
| 1691 | Kid Bay, Roderick Island | Y | | 5-Jan-19 | K806 | N | | 5-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 1 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 1-Jan-19 | K806 | pre | | 1-Jan-19 | 20 | Box seine | 18 | 37 | 11 | 21 | Treatment ongoing | 29-Dec-18 | 0.90 | 1.85 | 0.55 | 1.05 |
| 1691 | Kid Bay, Roderick Island | Y | | 20-Jan-19 | K807 | N | | 20-Jan-19 | 20 | Box seine | 0 | 7 | 0 | 0 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.10 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 16-Jan-19 | K807 | pre | | 16-Jan-19 | 20 | Box seine | 18 | 27 | 3 | 5 | Treatment ongoing | 29-Dec-18 | 0.90 | 1.35 | 0.15 | 0.25 |
| 1691 | Kid Bay, Roderick Island | Y | | 22-Jan-19 | K808 | N | | 22-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 23-Jan-19 | K809 | N | | 23-Jan-19 | 20 | Box seine | 3 | 5 | 1 | 2 | Treatment ongoing | 29-Dec-18 | 1.05 | 0.25 | 0.05 | 0.10 |
| 1691 | Kid Bay, Roderick Island | Y | | 20-Jan-19 | K809 | pre | | 20-Jan-19 | 20 | Box seine | 21 | 31 | 0 | 0 | Treatment ongoing | 29-Dec-18 | 1.95 | 1.55 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 20-Jan-19 | K810 | N | | 20-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 1-Jan-19 | K811 | N | | 1-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 1 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.05 |
| 1691 | Kid Bay, Roderick Island | Y | | 1-Jan-19 | K812 | N | | 1-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1691 | Kid Bay, Roderick Island | Y | | 12-Jan-19 | K813 | N | | 12-Jan-19 | 20 | Box seine | 0 | 0 | 1 | 0 | Treatment ongoing | 29-Dec-18 | 0.00 | 0.00 | 0.05 | 0.00 |
| 1697 | Colodden Point, Arvo Inlet | N | Recent transfer | | | | | | | | | | | | | | | | | |
| 1698 | Alstrom Point, Arvo Inlet | N | Follow | | | | | | | | | | | | | | | | | |
| 1700 | Mudflat Inlet South, North District | N | Follow | | | | | | | | | | | | | | | | | |
| 1702 | Goat Cove, Roderick Island | N | Harvest ongoing | | | | | 13-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | site to be empty in early February | | | | |
| 1705 | Williamson Passage, North Sound | Y | | 13-Jan-19 | 3 | Y | | 13-Jan-19 | 20 | Box seine | 0 | 1 | 0 | 0 | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1705 | Williamson Passage, North Sound | Y | | 13-Jan-19 | 5 | N | | 13-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | 0.00 | 0.05 | 0.00 | 0.00 |
| 1705 | Williamson Passage, North Sound | Y | | 13-Jan-19 | 7 | N | | 13-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1758 | Alfreda Point, Harris Channel | N | Follow | | | | | | | | | | | | | | | | | |
| 1762 | Gore Island, Harris Channel | N | Recent transfer | | | | | 25-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | 0.00 | 0.00 | 0.00 | 0.00 |
| 1789 | Conspicuous Pt., Roderick Island | Y | | 26-Jan-19 | 10 | Y | | 26-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | 0.00 | 0.00 | 0.00 | 0.00 |

| Facility Reference | Facility Name | Sampling Done This Month | If No Sampling, Explain | Sampling Event Start Date | Pen ID | Reference Pen | entry date | Pen Sample Date | Number of Fish Sampled | Sampling Method | Adult Females L. salmonis | Mottie L. salmonis | Challus | Mottie Calgus | Action Taken | Start Date (If for PC approval) | Comments | tent_perfi | not_perfi | chal_perfi | cal_perfi | sh | h | sh |
|--------------------|---|--------------------------|-------------------------|---------------------------|--------|---------------|------------|-----------------|------------------------|-----------------|---------------------------|--------------------|---------|---------------|--------------|---------------------------------|----------|------------|-----------|------------|-----------|----|---|----|
| 1789 | Conception Pt., Bligh Island | Y | | 26-Jan-19 | 8 | N | | 26-Jan-19 | 40 | Box seine | 0 | 0 | 0 | 0 | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 1825 | Noo-La, Clio Channel | Y | | 9-Jan-19 | 2 | Y | | 9-Jan-19 | 20 | Box seine | 4 | 7 | 1 | 16 | | | | 0.20 | 0.35 | 0.05 | 0.80 | | | |
| 1825 | Noo-La, Clio Channel | Y | | 9-Jan-19 | 7 | N | | 9-Jan-19 | 20 | Box seine | 0 | 5 | 6 | 13 | | | | 0.00 | 0.25 | 0.30 | 0.65 | | | |
| 1825 | Noo-La, Clio Channel | Y | | 9-Jan-19 | 9 | N | | 9-Jan-19 | 20 | Box seine | 0 | 4 | 14 | 16 | | | | 0.00 | 0.20 | 0.70 | 0.80 | | | |
| 1825 | Noo-La, Clio Channel | Y | | 23-Jan-19 | 1 | N | | 23-Jan-19 | 20 | Box seine | 4 | 7 | 28 | 79 | | | | 0.20 | 0.35 | 1.40 | 3.95 | | | |
| 1825 | Noo-La, Clio Channel | Y | | 23-Jan-19 | 2 | Y | | 23-Jan-19 | 20 | Box seine | 1 | 3 | 39 | 96 | | | | 0.05 | 0.15 | 1.95 | 4.80 | | | |
| 1825 | Noo-La, Clio Channel | Y | | 23-Jan-19 | 3 | N | | 23-Jan-19 | 20 | Box seine | 1 | 3 | 28 | 43 | | | | 0.05 | 0.15 | 1.40 | 2.15 | | | |
| 1839 | Wa-kwa | Y | | 14-Jan-19 | 1 | N | | 14-Jan-19 | 20 | Box seine | 0 | 2 | 0 | 127 | | | | 0.00 | 0.10 | 0.00 | 6.35 | | | |
| 1839 | Wa-kwa | Y | | 14-Jan-19 | 2 | N | | 14-Jan-19 | 20 | Box seine | 2 | 24 | 39 | 7 | | | | 0.10 | 1.20 | 1.95 | 0.35 | | | |
| 1839 | Wa-kwa | Y | | 14-Jan-19 | 3 | Y | | 14-Jan-19 | 20 | Box seine | 3 | 7 | 0 | 187 | | | | 0.15 | 0.35 | 0.00 | 9.35 | | | |
| 1849 | Muchalat Inlet North, Nootka Sound | Y | | 14-Jan-19 | 14 | N | | 14-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 1849 | Muchalat Inlet North, Nootka Sound | Y | | 14-Jan-19 | 14 | N | | 14-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 1849 | Muchalat Inlet North, Nootka Sound | Y | | 15-Jan-19 | 2 | Y | | 15-Jan-19 | 20 | Box seine | 0 | 0 | 0 | 0 | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 6-Jan-19 | 4 | N | | 6-Jan-19 | 20 | Box seine | 84 | 120 | 0 | 0 | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 6-Jan-19 | 7 | N | | 6-Jan-19 | 20 | Box seine | 57 | 98 | 0 | 3 | | | | 2.85 | 4.90 | 0.00 | 0.15 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 17-Jan-19 | 8 | N | | 17-Jan-19 | 20 | Box seine | 47 | 75 | 0 | 0 | | | | 2.35 | 3.75 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 19-Jan-19 | 11 | N | | 19-Jan-19 | 20 | Box seine | 13 | 13 | 0 | 0 | | | | 0.65 | 0.65 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 19-Jan-19 | 12 | N | | 19-Jan-19 | 20 | Box seine | 10 | 13 | 0 | 0 | | | | 0.50 | 0.65 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 20-Jan-19 | 11 | N | | 20-Jan-19 | 20 | Box seine | 7 | 8 | 0 | 0 | | | | 0.35 | 0.40 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 20-Jan-19 | 9 | N | | 20-Jan-19 | 20 | Box seine | 9 | 11 | 0 | 0 | | | | 0.45 | 0.55 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 20-Jan-19 | 7 | N | | 20-Jan-19 | 20 | Box seine | 6 | 6 | 0 | 0 | | | | 0.30 | 0.30 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 23-Jan-19 | 4 | N | | 23-Jan-19 | 20 | Box seine | 4 | 4 | 0 | 0 | | | | 0.20 | 0.20 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 24-Jan-19 | 5 | N | | 24-Jan-19 | 20 | Box seine | 5 | 5 | 0 | 0 | | | | 0.45 | 0.45 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 24-Jan-19 | 2 | N | | 24-Jan-19 | 20 | Box seine | 21 | 21 | 0 | 0 | | | | 0.25 | 0.25 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 25-Jan-19 | 3 | N | | 25-Jan-19 | 20 | Box seine | 28 | 29 | 0 | 0 | | | | 1.40 | 1.45 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 26-Jan-19 | 1 | Y | | 26-Jan-19 | 20 | Box seine | 12 | 12 | 0 | 0 | | | | 0.60 | 0.60 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 29-Jan-19 | 5 | N | | 29-Jan-19 | 20 | Box seine | 5 | 5 | 0 | 0 | | | | 0.25 | 0.25 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 29-Jan-19 | 7 | N | | 29-Jan-19 | 20 | Box seine | 5 | 5 | 0 | 0 | | | | 0.75 | 0.75 | 0.00 | 0.00 | | | |
| 1862 | Hecate, Hecate Channel | Y | | 29-Jan-19 | 8 | N | | 29-Jan-19 | 20 | Box seine | 14 | 17 | 0 | 0 | | | | 0.70 | 0.85 | 0.00 | 0.00 | | | |
| 1863 | Esperanza, Hecate Channel | Y | | 9-Jan-19 | 6 | N | | 9-Jan-19 | 20 | Box seine | 19 | 27 | 0 | 0 | | | | 0.95 | 1.35 | 0.00 | 0.00 | | | |
| 1863 | Esperanza, Hecate Channel | Y | | 11-Jan-19 | 2 | Y | | 11-Jan-19 | 20 | Box seine | 20 | 37 | 0 | 0 | | | | 1.05 | 1.85 | 0.00 | 0.00 | | | |
| 1863 | Esperanza, Hecate Channel | Y | | 11-Jan-19 | 4 | N | | 11-Jan-19 | 20 | Box seine | 14 | 25 | 0 | 0 | | | | 0.70 | 1.25 | 0.00 | 0.00 | | | |
| 1895 | Sheep Passage in vicinity of Pooley Is. | N | Fallow | | | | | | | | | | | | | | | | | | | | | |
| 1896 | Line Bay, vicinity of Pooley Island | N | Fallow | | | | | | | | | | | | | | | | | | | | | |
| 6668 | Plover Point, Fortune Channel, | Y | | 6-Jan-19 | 101 | Y | | 6-Jan-19 | 20 | Full seine | 60 | 74 | 0 | 0 | | | | 3.00 | 3.70 | 0.00 | 0.00 | | | |
| 6668 | Plover Point, Fortune Channel, | Y | | 7-Jan-19 | 108 | N | | 7-Jan-19 | 20 | Full seine | 44 | 74 | 1 | 0 | | | | 2.20 | 3.70 | 0.05 | 0.00 | | | |
| 6668 | Plover Point, Fortune Channel, | Y | | 7-Jan-19 | 110 | N | | 7-Jan-19 | 20 | Full seine | 49 | 85 | 0 | 0 | | | | 2.45 | 4.25 | 0.00 | 0.00 | | | |
| 7053 | Gh Va, Bull Harbour, Hope Is | N | Fallow | | | | | | | | | | | | | | | | | | | | | |
| 7054 | Winn tails (Heath Bay) | N | Fallow | | | | | | | | | | | | | | | | | | | | | |
| 7273 | Tsaya (Minstrel Island) | Y | | 14-Jan-19 | 1 | N | | 14-Jan-19 | 20 | Box seine | 6 | 11 | 8 | 172 | | | | 0.30 | 0.55 | 0.40 | 8.60 | | | |
| 7273 | Tsaya (Minstrel Island) | Y | | 14-Jan-19 | 2 | Y | | 14-Jan-19 | 20 | Box seine | 2 | 7 | 4 | 176 | | | | 0.10 | 0.35 | 0.20 | 8.80 | | | |
| 7273 | Tsaya (Minstrel Island) | Y | | 14-Jan-19 | 3 | N | | 14-Jan-19 | 20 | Box seine | 0 | 2 | 14 | 135 | | | | 0.00 | 0.10 | 0.70 | 6.75 | | | |
| 7713 | Cougar Bay, Totmie Channel | N | Fallow | | | | | | | | | | | | | | | | | | | | | |
| 7714 | Alexander Inlet | Y | | 5-Jan-19 | A03 | N | | 5-Jan-19 | 20 | Box seine | 2 | 7 | 49 | 111 | | | | 0.10 | 0.35 | 2.45 | 5.55 | | | |
| 7714 | Alexander Inlet | Y | | 5-Jan-19 | A01 | Y | | 5-Jan-19 | 20 | Box seine | 1 | 6 | 38 | 97 | | | | 0.05 | 0.30 | 1.90 | 4.85 | | | |
| 7714 | Alexander Inlet | Y | | 5-Jan-19 | A04 | N | | 5-Jan-19 | 20 | Box seine | 0 | 12 | 50 | 125 | | | | 0.00 | 0.60 | 2.50 | 6.25 | | | |
| 7714 | Alexander Inlet | Y | | 12-Jan-19 | A01 | Y | | 12-Jan-19 | 20 | Box seine | 2 | 9 | 29 | 45 | | | | 0.10 | 0.45 | 1.45 | 2.25 | | | |
| 7714 | Alexander Inlet | Y | | 12-Jan-19 | A02 | N | | 12-Jan-19 | 20 | Box seine | 2 | 10 | 40 | 103 | | | | 0.10 | 0.50 | 2.00 | 5.15 | | | |
| 7714 | Alexander Inlet | Y | | 13-Jan-19 | A04 | N | | 13-Jan-19 | 20 | Box seine | 2 | 6 | 50 | 153 | | | | 0.10 | 0.30 | 2.50 | 7.65 | | | |
| 7714 | Alexander Inlet | Y | | 25-Jan-19 | A01 | Y | | 25-Jan-19 | 20 | Box seine | 0 | 13 | 35 | 20 | | | | 0.00 | 0.65 | 1.75 | 1.00 | | | |
| 7714 | Alexander Inlet | Y | | 25-Jan-19 | A02 | N | | 25-Jan-19 | 20 | Box seine | 2 | 5 | 10 | 17 | | | | 0.10 | 0.25 | 0.50 | 0.85 | | | |
| 7714 | Alexander Inlet | Y | | 25-Jan-19 | A03 | N | | 25-Jan-19 | 20 | Box seine | 2 | 6 | 32 | 18 | | | | 0.10 | 0.30 | 1.60 | 0.90 | | | |
| 7714 | Alexander Inlet | Y | | 25-Jan-19 | A04 | N | | 25-Jan-19 | 20 | Box seine | 1 | 13 | 9 | 16 | | | | 0.05 | 0.65 | 0.45 | 0.80 | | | |

s.20(1)(b)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Thursday, March 7, 2019 3:48 PM
To: Waddington, Zac
Subject: FW: Sea Lice Overabundance Notification at Bare Bluff
Attachments: 1-March-2019 Sea Lice Overabundance Bare Bluff (V8.2).xls

They reported Bare Bluff but I don't see any others

Krista Sandberg

Aquaculture Data and Public Reporting Manager |
Gestionnaire de données sur l'aquaculture et de rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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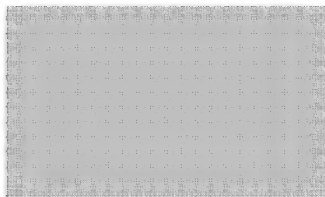
Canada

From: [REDACTED]
Sent: March-06-19 10:31 AM
To: AQFF.FishHealth (DFO/MPO)
Cc: [REDACTED]
Subject: Sea Lice Overabundance Notification at Bare Bluff

Hi,

Please find enclosed the sea lice overabundance notification for Bare Bluff.

Regards,



CERMAQ

Phone +1 250-286-0022 ext. [REDACTED]
Direct +1 250-286-0022 ext. [REDACTED]
Mobile + [REDACTED]

Cermaq Canada Ltd.
203 - 919 Island Hwy
V9W 2C2 Campbell River, BC, Canada

s.19(1)

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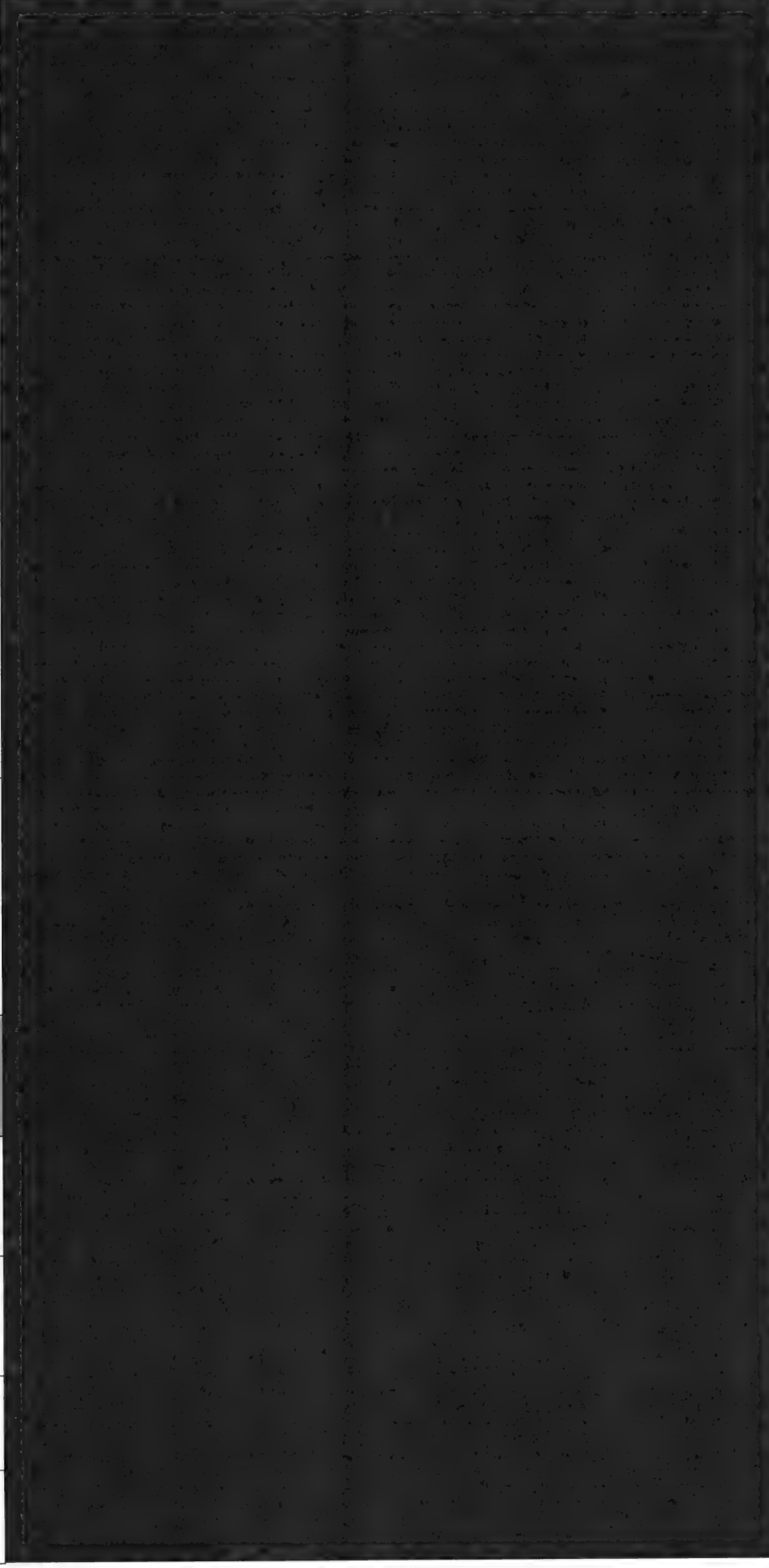
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| Licence Holder Name | Facility Reference No | Facility Name | Fish Health Zone |
|-------------------------|--------------------------|--|------------------|
| Licence Holder Selected | Facility Selected | Do Not Enter | Do Not Enter |
| Cermaq Canada Ltd | 1537 | Bare Bluff, Clayoquot Snd, Bedwell Snd | 2-2 |

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| Incident Date Input format: YYYY-MM-DD | Outmigration Period? (Y/N) Pick List | Current Inventory Input format: 9999999 | Average Motile Lice Input format: 99.99 | Absolute Sea Lice Inventory Do Not Enter | Planned Mitigation Category Pick List | Mitigation Description Describe in detail the mitigation measures planned ie) type of treatment, planned start date, etc. | Comments |
|--|--|---|--|--|--|---|----------|
| 2019-03-01 | Y | 456111 | 5.10 | 2326166 | Harvest | Harvest began Feb 24th, anticipated end date first week of April. | |



Wilkinson, Davida

From: Paylor, Adrienne
Sent: Thursday, April 25, 2019 3:11 PM
To: Waddington, Zac
Subject: FW: 90% Broughton salmon infected - sea lice

Zac can you pull some bullets together for this or get Sarah and Howie to look at the numbers?

From: McCorquodale, Brenda
Sent: April-25-19 2:31 PM
To: Paylor, Adrienne
Cc: Waddington, Zac; Patirana, Anoma
Subject: FW: 90% Broughton salmon infected - sea lice

Think we knew this was coming. Please prepare a response.
Brenda

Brenda McCorquodale

A/ Director, Aquaculture Management (April 18 – May 15, 2019)
Regional Manager, Aquaculture Resource Management
Fisheries and Oceans Canada
Gestionnaire régionale des ressources, Direction des pêches
Pêches et Océans Canada

1965 Island Diesel Way | Nanaimo, BC | Nanaimo, CB | V9S 5W8
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca
Telephone | Téléphone: 250-754-0367

From: Thomson, Andrew
Sent: Thursday, April 25, 2019 2:30 PM
To: McCorquodale, Brenda
Cc: Barton, Meagan
Subject: FW: 90% Broughton salmon infected - sea lice

Brenda

Please prepare a response to the points that [REDACTED] raises below.

- A. What have we seen, our opinion.
- B. What actions / audits we have done, are doing. s.19(1)

Please send to me ASAP.

I am writing to inform you that 90% of young wild salmon near Cermaq's Burdwood and Sir Edmund salmon farms in the Broughton Archipelago are currently infected with sea lice. This level of infection has not been seen since 2001 and was followed by a profound crash in salmon returns to that region, which triggered 1.) the Provincial sea lice action plan following farms on the wild salmon migration route, and 2.) limits were imposed on the number of lice allowed on farm salmon. The Burdwood farm is scheduled for decommissioning as per the First Nation agreement, however it's parting blow is going to be significant.

The potential cause of this current outbreak is a short list:

- either the farm lice counts don't accurately represent the total number of lice in the farm
- or farm lice limits are too high for the now dry winters resulting in high salinity which allows fewer lice to make more lice

This is the 3rd consecutive year of large sea louse outbreaks in BC. In 2017 it was drug resistant lice in Nootka Sound farms in Mowachaht, Muchalaht, Nuchatlaht, and Ehattesaht territories. In 2018, it was a drug resistant lice outbreak in Clayoquot Sound farms in Ahousaht territory. This year its the Musgamagw Dzawada'enuxw who are loosing the young salmon leaving the rivers of their territories.

I read emails from your vets warning your staff not to allow farm fish with drug resistant lice to be transferred from the west coast to the east coast of Vancouver Island. Despite this Grieg Seafood was granted a transfer licence to move fish from Nootka into the Noola farm in the Broughton. Given this, it is natural to question whether drug resistance is behind the current spike in losses to this cohort of wild salmon.

There are some steps DFO could take immediately:

- send a crew to these farms immediately to assess lice numbers on the farm's "non-performers" to see if they are the source of the problem, as they don't feed and thus don't ingest the delousing drugs
- do a drug-resistance bioassay on the lice in the farm, don't rely on the company for this, this would inform your next steps
- Require the culling of the "non-performers" on the farm if they are infected, to attempt to protect any uninfected wild salmon
- include Musgamagw Dzawada'enuxw representatives on every DFO visit to the farms

Minister, I thought I would provide feedback on media lines that have been reused in the past. Dozens of BC scientists have authored over 40 papers on the issue of sea lice from salmon farms killing wild salmon and we have ruled out many scenarios. Below is a brief list to help your staff advance progress in an expedient manner and assist DFOs credibility:

- please don't let staff promote uncertainty re a source of lice other than the several million farm salmon in the immediate region. In 20 years of suggesting this, your department has not produced credible evidence of an alternative host population.
- In particular, please don't let them add stickleback to the letter that is drafted for you to sign, as no one has found an egg-bearing louse on a stickleback, so they can't be the problem
- Please don't let them convince you of a coast wide lice outbreak phenomena, as lice are not like algae blooms. A salmon host population has to exist for juvenile lice to be present.

- Even if there is another invisible source, those lice would be settling on the local farm salmon, and the farms would amplify the lice, which is the whole problem with sea lice and salmon farms. This argument does not exonerate the farms
- Similarly high salinity does not make lice, it only encourages them to grow faster. There has to be a salmon host population
- Don't let your staff convince you pink and chum salmon are resistant to these lice and so unaffected. These fish are ~45mm long, have no protective scales yet and so the lice are boring into their flesh, eating them faster than they can grow.
- I would also advise not trying to avoid the established fact that sea lice from salmon farms kill wild salmon and that the industry has not learned how to control them. Yes, MOWI has a big new boat, but the last three outbreaks have been Cermaq and Grieg
- and Norway is moving the industry towards closed tanks, because *nothing* has solved the sea lice problem. Norway doesn't look after its wild salmon, they want the industry to thrive. Closed containment is meant to keep the farm salmon alive, because the lice are such a problem.

I hope you can stop this outbreak.

Thank you for your time,



s.19(1)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, April 29, 2019 2:59 PM
To: Waddington, Zac; McConnachie, Sarah
Subject: 2019 sea lice reports ready for your review

Hi Zac and Sarah,

The January, February and March sea lice reports are complete and ready for your review.

Summary: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\2019 Farm Level Sea Lice Summary.xlsx

Calculator: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\SL Farm Level Calculator 2019.xlsx

Please review the cells highlighted in yellow – we have a few concerns of farms only counting once when they should be bi-weekly counts.

Krista Sandberg

Data and Public Reporting Manager | Gestionnaire de données et de rapports publics
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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s.16(2)(c)

| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chlamys | monthly farm abundance caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|----------------|------------------|----------|------------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--|--|------------|------------|-----|---|
| 227 | Cermaq Canada | Bawden | 49.30798 | -126.00721 | 2.3 | Clayoquot | 1 | 0.13 | 0.00 | 0.13 | 0.10 | In-feed Treatment; Sampling methodology does not meet requirements outlined in licence conditions (<4 pens); Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins); Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | | | count of single pen on 10-May, fish were entered from Ross Apr 18-24; SLICE 12-May (area management for caligus) |
| 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | Clayoquot | 0 | | | | | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | | | |
| 1148 | Cermaq Canada | Binns Island | 49.34182 | -125.95328 | 2.3 | Clayoquot | 1 | 0.07 | 0.02 | 0.00 | 0.00 | In-feed Treatment; Sampling methodology does not meet requirements outlined in licence conditions (<4 pens); Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins); Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | | | single count of 2 pens 7-May, fish entered from Dixon April 25-30; SLICE 20-May (area management for caligus) |
| 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | Clayoquot | 2 | 0.07 | 0.01 | 0.25 | 0.62 | In-feed Treatment; Sampling methodology does not meet requirements outlined in licence conditions (health management action) | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (mesure de gestion de la santé) | 1 | | | 2 counts of 2 pens with weird dates (May 1/8, 12/13). No reason why full count of 3 pens couldn't be done? SLICE 19-May (area management for caligus). Not sure what to put for comment as to why full 3 pens were not counted? |
| 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | Clayoquot | 0 | | | | | Count(s) not performed; Follow up actions taken | Dénombrement(s) non effectué(s); Mesures de suivi prises | 1 | | | SLICE 5-May, no counts performed before or after treatment - |
| 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | Clayoquot | 1 | 0.07 | 0.07 | 0.02 | 0.25 | Sampling methodology does not meet requirements outlined in licence conditions (health management action); Count(s) not performed (health management action) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (mesure de gestion de la santé); Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | | single count of 2 pens 18-May, could have completed second count earlier in month?; Florfenicol 3-May, 19-May; Issues with plankton and mouthrot |
| 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | Clayoquot | 2 | 6.86 | 3.91 | 0.21 | 0.02 | Harvesting | Récolte | 2 | | | EXCEEDED 15-May (9.52), 30-May (4.20); Harvest complete 11-Jun |
| 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | Clayoquot | 1 | 0.04 | 0.00 | 0.08 | 0.00 | Count(s) not required (<21 days post in-feed treatment) | Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | | | single pen 1-May moved to April; Single count 14-May, could have completed second count earlier in month?; SLICE completed 18-May (area management for caligus) |

s.20(1)(b)
s.21(1)(b)

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|------|------------------|----------------------------|----------|------------|-----|--|--|--|--|---|-------|------|--------------|--------------|---|--|---|---|
| 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | | | | | 2 | 0.09 | 0.00 | 0.04 | 0.01 | Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | 2 counts of only 2 pens, single pen 16-May not included - no reason stated for why they couldn't count a full 3 pens; Howie |
| 1738 | Grieg Seafood BC | Atrevida | 49.65603 | -126.45404 | 2.4 | | | | | 3 | 0.13 | 0.05 | 0.06 | 0.02 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 3 counts, 2nd 2 pens |
| 1789 | Grieg Seafood BC | Concepcion | 49.65923 | -126.47587 | 2.4 | | | | | 2 | 0.17 | 0.06 | 0.08 | 0.43 | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | |
| 1863 | Grieg Seafood BC | Esperanza - post-treatment | 49.87814 | -126.76145 | 2.4 | | | | | 1 | 1.63 | 1.63 | not reported | not reported | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | single count 22-May not included; chalinus and caligus not counted |
| 1863 | Grieg Seafood BC | Esperanza - pre-treatment | 49.87814 | -126.76145 | 2.4 | | | | | 1 | 1.63 | 6.33 | not reported | not reported | Medicinal bath treatment; Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Traitement médicamenteux dans un bain; Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | Issue with dates; Howie contacting; EXCEEDED 7-May (16.05); H202 21-May; chalinus and caligus not counted |
| 1762 | Grieg Seafood BC | Gore | 49.6466 | -126.43167 | 2.4 | | | | | 2 | 0.15 | 0.10 | 0.09 | 0.00 | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | |
| 1862 | Grieg Seafood BC | Hecate - post-treatment | 49.86799 | -126.7573 | 2.4 | | | | | 1 | 2.65 | 2.53 | not reported | not reported | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | post-H202 count only 2 pens, likely due to harvesting; chalinus and caligus not counted |
| 1862 | Grieg Seafood BC | Hecate - pre-treatment | 49.86799 | -126.7573 | 2.4 | | | | | 1 | 18.07 | 9.28 | not reported | not reported | Medicinal bath treatment; Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Traitement médicamenteux dans un bain; Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | EXCEEDED 11-May (18.07); H202 17-May; chalinus and caligus not counted |
| 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33953 | 2.4 | | | | | 3 | 0.13 | 0.07 | 0.00 | 0.01 | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | single pen counted 15-May not included (1.05); post-treatment count completed 29-May, due to low DO? If they had counted more pens immediately, post-treatment then their post-treatment count would not have been so high; Did they do another H202 treatment in June? could add to comments; chalinus and caligus not counted |
| 1079 | Grieg Seafood BC | Steamer - post-treatment | 49.8868 | -126.7511 | 2.4 | | | | | 1 | 8.55 | 6.25 | not reported | not reported | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | |

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|------|------------------|-------------------------|----------|------------|-----|----------------|---|-------|--------------|--------------|---|--|-------|---|
| 1079 | Grieg Seafood BC | Steamer - pre-treatment | 49.8868 | -126.7911 | 2.4 | Esperanza | 1 | 14.17 | not reported | not reported | Medicinal bath treatment; Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Traitement médicamenteux dans un bain; Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | EXCEEDED 9-May (31.8); H2O2 15-May; chalimus and caligus not counted |
| 1705 | Grieg Seafood BC | Williamson | 49.65623 | -126.42849 | 2.4 | Nootka | 1 | 0.13 | 0.05 | 0.03 | Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | single pen 7-May not included; 2nd count 23 May only 2 pens, only 3 pens counted in total, did not perform 2 full events, no indication why |
| 144 | MOWI Canada West | Koskimo | 50.45861 | -127.88988 | 2.4 | Quatsino | 5 | 0.22 | 0.05 | 2.58 | 1.83 | | 1 | |
| 1238 | MOWI Canada West | Mahatta West | 50.469 | -127.83538 | 2.4 | Quatsino | 4 | 0.23 | 0.08 | 0.68 | 0.85 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 1st and 3rd 2 pens |
| 1237 | MOWI Canada West | Monday Rocks | 50.48588 | -127.87584 | 2.4 | Quatsino | 5 | 0.37 | 0.11 | 2.32 | 1.64 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 5 counts, 2nd 4th 2 pens |
| 1698 | Grieg Seafood BC | Ahlstrom | 49.7793 | -124.15395 | 3.1 | Sunshine Coast | 1 | 0.15 | 0.00 | 0.23 | 0.15 | Count(s) not required (<4 pens) | 1 | recent entry from Gold River Hatchery, single count 31-May |
| 1697 | Grieg Seafood BC | Culoden | 49.79595 | -124.10162 | 3.1 | Sunshine Coast | 2 | 0.19 | 0.03 | 0.35 | 0.29 | | 1 | |
| 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | Sunshine Coast | 1 | 0.00 | 0.00 | 0.00 | 0.00 | Count(s) not performed (poor environmental conditions) | 1 | single count 26-May, fish entered from Gold River early March, no reason provided for why first count was not completed - |
| 746 | Grieg Seafood BC | Site 13 | 49.6291 | -123.84265 | 3.1 | Sunshine Coast | 1 | 0.03 | 0.00 | 0.23 | 0.10 | Count(s) not performed (poor environmental conditions); Sampling methodology does not meet requirements outlined in licence conditions (<4 pens) | 1 | single count of 2 pens, harmful algae bloom |
| 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | Sunshine Coast | 2 | 0.13 | 0.01 | 0.58 | 0.08 | Count(s) not required (broodstock in spawning year) | 1 | |
| 303 | MOWI Canada West | Glacial Creek | 50.01008 | -123.90241 | 3.1 | Sunshine Coast | 0 | | | | | Dénombrement(s) non requis (Géniteurs à l'année du frai) | Brood | |
| 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | Discovery | 2 | 1.57 | 0.91 | 0.07 | 0.08 | | 2 | |
| 1300 | MOWI Canada West | Althorpe | 50.47531 | -125.80975 | 3.2 | Discovery | 6 | 0.22 | 0.08 | 1.31 | 0.34 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 6 counts, 1st 3rd 2 pens, 4th 4 pens |

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|------|------------------|-----------------------------|----------|------------|-----|-----------|---|------|------|------|------|---|--|--------|---|
| 790 | MOWI Canada West | Chancellor Channel | 50.41723 | -125.66284 | 3.2 | Discovery | 4 | 1.85 | 0.60 | 1.74 | 0.22 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 1st 2nd 3rd 2 pens - not actually 2 full events; EXCEEDED 27-May (3.08) |
| 1581 | MOWI Canada West | Hardwicke | 50.41339 | -125.76974 | 3.2 | Discovery | 3 | 0.26 | 0.14 | 0.01 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 3 counts, 3rd 2 pens |
| 100 | MOWI Canada West | Lees Bay | 50.41063 | -125.70029 | 3.2 | Discovery | 5 | 1.13 | 0.47 | 2.37 | 0.22 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 3rd 4th 2 pens |
| 78 | MOWI Canada West | Phillips Arm | 50.48825 | -125.35658 | 3.2 | Discovery | 5 | 0.09 | 0.04 | 0.14 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 4th 2 pens |
| 1136 | MOWI Canada West | Shaw Point - post-treatment | 50.48527 | -125.88981 | 3.2 | Discovery | 4 | 1.18 | 0.57 | 0.10 | 0.02 | | | Exceed | FW bath, did my best to separate out pre/post treatment counts; EXCEEDED 10-May (10 pen count) |
| 1135 | MOWI Canada West | Shaw Point - pre-treatment | 50.48527 | -125.88981 | 3.2 | Discovery | 1 | | 1.18 | 3.01 | 1.03 | Non-medical bath treatment | Traitement non médical au bain | Exceed | |
| 380 | MOWI Canada West | Sonora Point | 50.42362 | -125.30517 | 3.2 | Discovery | 5 | 0.27 | 0.11 | 0.37 | 0.13 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 4th 2 pens |
| 1144 | Cermaq Canada | Burdwood | 50.7969 | -126.49581 | 3.3 | Broughton | 3 | 0.23 | 0.09 | 0.02 | 0.11 | | | 2 | single pen 31-May moved to June |
| 819 | Cermaq Canada | Cecil Island | 50.85123 | -126.71498 | 3.3 | Broughton | 2 | 0.07 | 0.00 | 0.01 | 0.68 | | | 1 | single pen 31-May moved to June |
| 458 | Cermaq Canada | Cypress Harbour | 50.83772 | -126.66313 | 3.3 | Broughton | 1 | 2.78 | 1.27 | 1.99 | 0.03 | In-feed Treatment | Traitement administré dans l'alimentation | Brood | SLICE 16-May, single pen 25-May not included |
| 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | Broughton | 2 | 0.18 | 0.08 | 0.07 | 0.46 | | | 2 | single pen 2-May moved to April |
| 1336 | Cermaq Canada | Simmonds Point | 50.87791 | -126.30153 | 3.3 | Broughton | 1 | 0.34 | 0.11 | 7.69 | 0.14 | In-feed Treatment | Traitement administré dans l'alimentation | 1 | SLICE 25-May, only 1 count 13-May, could have done 2? What comment to use for why 2nd count wasn't performed? |
| 728 | Cermaq Canada | Sir Edmund Bay | 50.83095 | -126.59684 | 3.3 | Broughton | 3 | 0.95 | 0.48 | 0.01 | 0.00 | | | 2 | single pen 31-May moved to June |
| 1825 | Grieg Seafood BC | Noo-ia - post-treatment | 50.60799 | -126.36301 | 3.3 | Broughton | 1 | 0.36 | 0.22 | 0.00 | 0.00 | | | 2 | SLICE 7-May, 2nd count not included (post-Slice) |
| 1825 | Grieg Seafood BC | Noo-ia - pre-treatment | 50.60799 | -126.36301 | 3.3 | Broughton | 1 | 2.48 | 1.37 | 0.08 | 0.96 | In-feed Treatment | Traitement administré dans l'alimentation | 2 | |
| 7273 | Grieg Seafood BC | Tsaya | 50.61225 | -126.33212 | 3.3 | Broughton | 2 | 0.59 | 0.23 | 0.13 | 0.56 | | | 2 | |
| 1839 | Grieg Seafood BC | Wa-ka | 50.60106 | -126.34741 | 3.3 | Broughton | 2 | 0.42 | 0.11 | 0.05 | 0.52 | | | 2 | |
| 1586 | MOWI Canada West | Doctor Islets | 50.65373 | -126.28925 | 3.3 | Broughton | 4 | 0.06 | 0.02 | 0.36 | 0.17 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 1st 3rd 2 pens; initial sw entry changed to vc2 |
| 1618 | MOWI Canada West | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | Broughton | 3 | 0.03 | 0.01 | 4.38 | 0.10 | | | 1 | 3 counts, 1st 3rd 2 pens, not actually 2 full counts; high chlamus |

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|------|------------------|--------------------------------|----------|------------|-----|---------------|---|------|------|------|------|--|---|---|---|--|
| 143 | MOWI Canada West | Larsen Island | 50.60175 | -126.63284 | 3.3 | Broughton | 4 | 0.18 | 0.04 | 0.39 | 0.08 | | Sampling methodology does not meet requirements outlined in licence conditions (health management action) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (mesure de gestion de la santé) | 1 | 4 counts, 4th 2 pens |
| 467 | MOWI Canada West | Midsummer | 50.65784 | -126.66298 | 3.3 | Broughton | 2 | 0.19 | 0.01 | 0.75 | 0.71 | | | | 1 | 2 counts, 2nd count 4 days after 1st (17-May) and only 2 pens - mouthrot treatment at end of month |
| 141 | MOWI Canada West | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | Broughton | 3 | 0.08 | 0.04 | 0.00 | 0.04 | | | | 2 | |
| 1059 | MOWI Canada West | Sargeant Pass | 50.67346 | -126.18995 | 3.3 | Broughton | 5 | 0.45 | 0.07 | 3.03 | 0.67 | | | | 1 | 5 counts, 1st 3rd 5th 2 pens; initial saw entry Jan-19, changed to y/c1 |
| 465 | MOWI Canada West | Swanson | 50.61871 | -126.70473 | 3.3 | Broughton | 5 | 0.04 | 0.00 | 0.64 | 0.11 | | | | 2 | 5 counts, 3rd 2 pens |
| 739 | MOWI Canada West | Upper Retreat | 50.72183 | -126.5681 | 3.3 | Broughton | 0 | | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | |
| 820 | MOWI Canada West | Wicklow Point - post-treatment | 50.78659 | -126.69153 | 3.3 | Broughton | 1 | 0.42 | 0.12 | 0.00 | 0.08 | | In-feed Treatment | Traitement administré dans l'alimentation | 2 | EXCEEDED 6-May (5.38); SLICE 6-May |
| 820 | MOWI Canada West | Wicklow Point - pre-treatment | 50.78659 | -126.69153 | 3.3 | Broughton | 1 | | 1.25 | 9.73 | 3.53 | | | | 2 | |
| 892 | MOWI Canada West | Bell Island | 50.83242 | -127.52057 | 3.4 | Port Hardy | 5 | 0.66 | 0.22 | 0.27 | 0.11 | | | | 1 | |
| 1288 | MOWI Canada West | Doyle Island | 50.81456 | -127.48698 | 3.4 | Port Hardy | 2 | 0.10 | 0.05 | 0.49 | 0.00 | | | | 2 | |
| 1293 | MOWI Canada West | Duncan Island | 50.81195 | -127.55668 | 3.4 | Port Hardy | 5 | 0.07 | 0.05 | 0.63 | 0.03 | | | | 2 | |
| 7053 | MOWI Canada West | Ghi'ya | 50.90078 | -127.93638 | 3.4 | Port Hardy | 5 | 0.62 | 0.23 | 1.70 | 0.21 | | | | 1 | 5 counts, 2nd 4th 2 pens |
| 1198 | MOWI Canada West | Raynor | 50.89353 | -127.25359 | 3.4 | Port Hardy | 5 | 0.50 | 0.17 | 1.59 | 0.68 | | | | 1 | |
| 1382 | MOWI Canada West | Robertson | 50.93155 | -127.42258 | 3.4 | Port Hardy | 2 | 0.18 | 0.14 | 0.19 | 0.06 | | | | 2 | |
| 831 | MOWI Canada West | Shelter Pass | 50.88414 | -127.5004 | 3.4 | Port Hardy | 4 | | 1.75 | 1.19 | 0.37 | | Management action planned (in-feed treatment) | Mesure de gestion planifiée (Traitement administré dans l'alimentation) | 2 | 4 counts, 2nd 4th 2 pens; EXCEEDED 12-May (3.55), 19-May (6.32), SLICE ordered for early June |
| 7714 | MOWI Canada West | Alexander | 52.67648 | -128.57494 | 3.5 | Central Coast | 3 | 0.27 | 0.04 | 5.01 | 1.64 | | | | 1 | single pen 15-May not included |
| 7713 | MOWI Canada West | Cougar | 52.71993 | -128.57432 | 3.5 | Central Coast | 2 | 0.28 | 0.02 | 1.48 | 0.22 | | | | 1 | |
| 1691 | MOWI Canada West | Kid Bay | 52.80048 | -128.40111 | 3.5 | Central Coast | 4 | 0.67 | 0.30 | 0.17 | 0.12 | | | | 2 | |

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Number of Counts Performed | monthly abundance motile | monthly abundance females | monthly farm abundance callicus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|-----------------------|------------------|----------|------------|------------------|----------------------------|--------------------------|---------------------------|---------------------------------|------------------|--|------------|------------|-----|--|
| 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 1 | 3.00 | 0.69 | 1.11 | 0.00 | Récolte | 2 | | | EXCEEDED 18-Feb (5.08); SINGLE COUNT - should have been doing bi-weekly counts, exceeding since 15-Dec; Harvest began 24-Feb |
| 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | 1 | 1.69 | 0.89 | 0.56 | 0.03 | | 2 | | | |
| 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | | 1 | | | |
| 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.13 | | 1 | | | |
| 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 0 | | | | | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | 2 | 3.36 | 2.07 | 0.03 | 0.00 | Management action planned (Medicinal bath treatment) | 2 | | | EXCEEDED 1-Feb (3.76), below threshold 26-Feb (2.92); 22 days between samples, should be bi-weekly counts; H2O2 planned for 10-Mar |
| 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | 0 | | | | | | 1 | | | |
| 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.77587 | 2.4 | 1 | 0.02 | 0.02 | 0.02 | 0.15 | | 1 | | | |
| 1863 | Grieg Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | 1 | 2.40 | 1.28 | 0.00 | 0.00 | | 2 | | | |
| 1762 | Grieg Seafood BC | Gore | 49.64666 | -126.43167 | 2.4 | 1 | 0.02 | 0.00 | 0.03 | 0.08 | | 1 | | | |
| 1862 | Grieg Seafood BC | Hecate | 49.86799 | -126.75773 | 2.4 | 1 | 0.62 | 0.58 | 0.00 | 0.00 | | 2 | | | |
| 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33553 | 2.4 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | | 1 | | | |
| 1079 | Grieg Seafood BC | Steamer | 49.8868 | -126.7911 | 2.4 | 1 | 1.62 | 1.01 | 0.18 | 0.00 | | 2 | | | |
| 1705 | Grieg Seafood BC | Williamson | 49.65623 | -126.2849 | 2.4 | 1 | 0.03 | 0.03 | 0.00 | 0.00 | | 1 | | | |
| 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.89388 | 2.4 | 2 | 0.26 | 0.09 | 0.63 | 0.14 | | 1 | | | |
| 1238 | Marine Harvest Canada | Mahatta West | 50.469 | -127.83338 | 2.4 | 3 | 0.03 | 0.01 | 0.09 | 0.08 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 3 counts, 2nd 2 pens |
| 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 4 | 0.28 | 0.11 | 1.38 | 0.21 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 4 counts, 2nd 4th 2 pens |
| 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0 | | | | | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 746 | Grieg Seafood BC | Site 13 | 49.6291 | -123.84265 | 3.1 | 0 | | | | | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | 1 | | | | | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 303 | Marine Harvest Canada | Glacial Creek | 50.01008 | -123.90741 | 3.1 | 0 | | | | | Dénombrement(s) non requis (Géniteurs à l'arrivée du frai) | Brood | | | |
| 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 0 | | | | | Dénombrement(s) non requis (récolte) | 2 | | | Fallow as of end of February |
| 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 1 | 1.37 | 0.68 | 0.38 | 0.18 | | 2 | | | |
| 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0 | | | | | Dénombrement(s) non requis (récolte) | 2 | | | |

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|------|-----------------------|----------------------------|----------|------------|-----|---|------|------|------|------|---|---|-------|--|
| 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | 4 | 2.63 | 0.71 | 1.50 | 3.55 | Management action planned (In-feed treatment): Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement administré dans l'alimentation): La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 2nd, 3rd and 4th 2 pens; EXCEEDED 25-Feb (3.85); SLICE planned for early March |
| 790 | Marine Harvest Canada | Chancellor Channel | 50.41723 | -125.66284 | 3.2 | 4 | 0.19 | 0.10 | 0.02 | 0.04 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 2nd and 4th 2 pens |
| 1581 | Marine Harvest Canada | Hardwicke - post-treatment | 50.41339 | -125.76974 | 3.2 | 1 | 1.67 | 1.43 | 0.25 | 0.00 | Mechanical removal treatment: Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Traitement par retrait mécanique: La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | post treatment count of 2 pens; Hydrolizer |
| 1581 | Marine Harvest Canada | Hardwicke - pre-treatment | 50.41339 | -125.76974 | 3.2 | 4 | 6.72 | 3.03 | 3.98 | 2.41 | Management action planned (Mechanical removal treatment): Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement par retrait mécanique): La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 pre-treatment counts, 2nd and 3rd 2 pens; EXCEEDED 9-Feb (6.15), 18-Feb (6.98), 28-Feb (1.60) |
| 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 4 | 0.21 | 0.13 | 0.00 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 2nd and 4th 2 pens |
| 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | 4 | 1.08 | 0.54 | 0.15 | 0.00 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 3rd 2 pens |
| 1136 | Marine Harvest Canada | Shaw Point | 50.48527 | -125.88981 | 3.2 | 3 | 3.75 | 0.95 | 1.68 | 0.34 | Management action planned (Non-medical bath treatment): Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement non médical au bain): La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | Brood | 3 counts, 1st and 2nd 4 pens; EXCEEDED 16-Feb (5.46), 27-Feb (1.60); Freshwater bath treatment planned for March - comment OK? Do you want to differentiate FW bath and H2O2 bath? |
| 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 3 | 0.53 | 0.30 | 0.01 | 0.02 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 3 counts, 2nd 2 pens |
| 1144 | Cermaq Canada | Burdwood | 50.7969 | -126.49581 | 3.3 | 1 | 1.36 | 0.54 | 0.00 | 1.33 | | | 1 | |
| 458 | Cermaq Canada | Cypress Harbour | 50.83772 | -126.66313 | 3.3 | 1 | 0.58 | 0.31 | 0.37 | 0.03 | | | Brood | |
| 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 1 | 0.44 | 0.04 | 0.34 | 0.73 | | | 1 | |
| 728 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 1 | 0.67 | 0.32 | 0.03 | 0.41 | | | 2 | |
| 1825 | Grieg Seafood BC | Noo-ia | 50.60799 | -126.36301 | 3.3 | 1 | 0.28 | 0.08 | 1.08 | 0.33 | | | 1 | |
| 7273 | Grieg Seafood BC | Ts-ya | 50.61225 | -126.33212 | 3.3 | 1 | 0.25 | 0.15 | 0.03 | 6.60 | | | 1 | |
| 1839 | Grieg Seafood BC | Wa-ka | 50.60106 | -126.34741 | 3.3 | 1 | 0.23 | 0.15 | 0.28 | 3.57 | | | 1 | |

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|------|-----------------------|--------------------------------|----------|------------|-----|---|------|------|-------|------|---|--|---|--|
| 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 4 | 0.67 | 0.19 | 10.46 | 4.69 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 2nd 2 pens, 4th 4 pens; SLICE 26-Feb |
| 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 0 | | | | | Fallow | Mise en jachère | | |
| 141 | Marine Harvest Canada | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | 3 | 0.76 | 0.38 | 2.49 | 0.65 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 3 counts, 1st and 2nd 2 pens |
| 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 2 | 0.01 | 0.00 | 0.03 | 0.00 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 2 counts, 2nd 2 pens |
| 465 | Marine Harvest Canada | Swanson | 50.61871 | -126.70473 | 3.3 | 4 | 0.98 | 0.43 | 6.31 | 0.60 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 2nd 2 pens; SLICE 24-Feb |
| 820 | Marine Harvest Canada | Wicklow Point - post-treatment | 50.78659 | -126.69153 | 3.3 | 1 | 0.25 | 0.22 | 0.03 | 0.00 | Mechanical removal treatment | Traitement par retrait mécanique | 1 | Hydrolicer 13-Feb but had to stop due to bi-catch concerns |
| 820 | Marine Harvest Canada | Wicklow Point - pre-treatment | 50.78659 | -126.69153 | 3.3 | 2 | 1.32 | 0.64 | 1.13 | 0.55 | Management action planned (Mechanical removal treatment) | Mesure de gestion planifiée (Traitement par retrait mécanique) | 1 | |
| 1336 | Cermaq Canada | Simmonds Point | 50.87791 | -126.90153 | 3.4 | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | |
| 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 4 | 0.30 | 0.10 | 0.36 | 0.12 | | | 1 | |
| 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 2 | 1.93 | 0.70 | 1.39 | 0.37 | In-feed treatment | Traitement administré dans l'alimentation | 2 | SLICE 14-Feb, counts 16-Feb and 25-Feb not included |
| 1293 | Marine Harvest Canada | Duncan Island | 50.8195 | -127.55568 | 3.4 | 2 | 2.27 | 1.00 | 0.75 | 0.23 | In-feed treatment | Traitement administré dans l'alimentation | 2 | SLICE 13-Feb, counts 22-Feb and 27 Feb not included |
| 7053 | Marine Harvest Canada | Ghi ya | 50.90078 | -127.93638 | 3.4 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | Sampling methodology does not meet requirements outlined in licence conditions (<4 pens) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (<4 bassins) | 1 | single count of 2 pens, recently transferred in |
| 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | | | | | | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | |
| 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | 1 | 0.03 | 0.00 | 0.63 | 0.13 | Sampling methodology does not meet requirements outlined in licence conditions (<4 pens) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (<4 bassins) | 1 | single count of 2 pens, recently transferred in - only 5 pens and still receiving smolts |
| 1382 | Marine Harvest Canada | Robertson - post-treatment | 50.93155 | -127.42258 | 3.4 | 1 | 1.32 | 0.70 | 0.00 | 0.10 | In-feed treatment | Traitement administré dans l'alimentation | 2 | |
| 1382 | Marine Harvest Canada | Robertson - pre-treatment | 50.93155 | -127.42258 | 3.4 | 1 | 4.93 | 2.27 | 1.22 | 0.92 | Management action planned (In-feed treatment) | Mesure de gestion planifiée (Traitement administré dans l'alimentation) | 2 | SLICE 3-Feb, count 17-Feb not included as post Slice; EXCEEDED 5-Feb (4.93) |
| 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 4 | 0.15 | 0.04 | 0.40 | 0.11 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 2nd 4th 2 pens |
| 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.5004 | 3.4 | 3 | 0.49 | 0.19 | 0.97 | 0.19 | | Traitement médicamenteux dans un bain | 2 | |
| 7714 | Marine Harvest Canada | Alexander - post-treatment | 52.67648 | -128.57494 | 3.5 | 1 | 0.01 | 0.00 | 0.03 | 0.00 | Medicinal bath treatment | Traitement médicamenteux dans un bain | 1 | H202 19-Feb |

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|------|-----------------------|---------------------------|----------|------------|-----|---|------|------|------|------|---|--|---|----------------------|
| 7714 | Marine Harvest Canada | Alexander - pre-treatment | 52.67648 | -128.57494 | 3.5 | 3 | 0.53 | 0.11 | 1.07 | 1.36 | Management action planned (Medicinal bath treatment) | Mesure de gestion planifiée (Traitement médicamenteux dans un bain) | 1 | |
| 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.4159 | 3.5 | 0 | | | | | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | |
| 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 5 | 0.19 | 0.01 | 0.14 | 0.18 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 1st 2 pens |

s.20(1)(b)

Wilkinson, Davida

From: Waddington, Zac
Sent: Friday, May 3, 2019 8:56 AM
To: Paylor, Adrienne; Doucette, Claire
Subject: FW: Sea lice management update for Bedwell Sound
Attachments: Sea Lice Mngt Update Bedwell Sound 2.5.19.pdf

FYI

Cermaq has provided an updated plan for Clayoquot and thus far has been in compliance at all three sites which exceeded this outmigration.

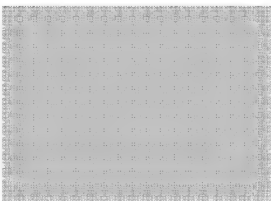
Zac

From: [REDACTED]
Sent: May-02-19 4:54 PM
To: Waddington, Zac <Zac.Waddington@dfo-mpo.gc.ca>; Keith, Ian <Ian.Keith@dfo-mpo.gc.ca>
Cc: [REDACTED]
Subject: Sea lice management update for Bedwell Sound

Hi,

As per our conversation last week here is an update on our sea lice management at Bare Bluff, Bedwell and Plover.

Kind Regards,



CERMAQ

Phone +1 250-286-0022 ext. [REDACTED]
Direct +1 250-286-0022 ext. [REDACTED]
Mobile + [REDACTED]

Cermaq Canada Ltd.
203 - 919 Island Hwy
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Update of Sea Lice Management Plan at Cermaq Canada's Bare Bluff, Bedwell, and Plover

2nd May 2019

The management of the sea lice in Bedwell Sound is following the plan set out in the 27th February 2019 letter.

Cermaq Canada's hydrolicer although being delivered on time, will not be available for use before June 2019, which is unfortunately too late to be used on this affected year class, in Bedwell Sound.

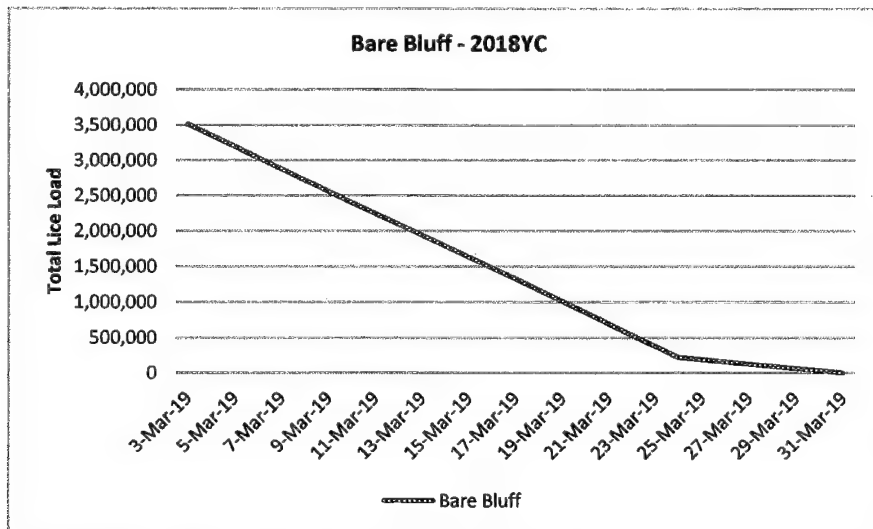
As per Cermaq Canada's established program, the Clayoquot Sound wild juvenile salmon monitoring is proceeding as planned (4 separate sampling events in April and May 2019). As compared to last year, Cermaq Canada is including the late May sampling event, on top of adding sampling locations.

Bare Bluff Farm Site

The site's sea lice levels are being addressed through an accelerated harvest.

- Levels on March 1st were above 3 motiles per fish
- DFO was notified of overabundance on March 6th 2019
- Harvest started prior to March 1st 2019
- Site was down to 3 populated pens on March 10th 2019
- Site harvested out by March 31st 2019

The following graph shows the lice abundance at Bare Bluff during the harvesting period:



Bedwell Farm Site

The site is currently being harvested out at an accelerated pace.

- Levels on March 1st were below 3 motiles per fish
- Site had over 3 motiles per fish as of March 20th 2019
- DFO was notified of overabundance on March 25th 2019
- Harvest started April 2nd 2019 and site is having an accelerated harvest
- Site is down to 3 populated pens as of April 28th 2019



Plover Farm Site

The site is currently being harvested out as an accelerated rate to manage sea lice levels.

- Levels on March 1st were below 3 motiles per fish
- Site had over 3 motiles per fish as of March 3rd 2019
- DFO was notified of overabundance on March 8th 2019
- Site was treated with hydrogen peroxide March 10th to 18th 2019 and sea lice numbers were reduced to below 3 motiles per fish
- Site had over 3 motiles per fish as of April 15th 2019
- DFO was notified of overabundance on April 18th 2019
- Harvest started April 29th 2019 and site is having an accelerated harvest

Cermaq Canada has accelerated harvest for all three sites and plans to have these sites followed by the first week of June. This is ahead of schedule compared to our original plan of harvesting until the end of June and therefore commercially impacts our overall harvested biomass for Bare Bluff, Bedwell and Plover.

It is important to note that all the new generation S0 sites (Dixon Bay, Millar Channel and Ross Pass) continue to have low levels of lice (below 0.4 motiles) and S1 sites (Mussel Rock and Saranac) have no lice which translates into an overall lower lice load when compared to previous years, in Clayoquot Sound.

Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, April 29, 2019 2:59 PM
To: Waddington, Zac; McConnachie, Sarah
Subject: 2019 sea lice reports ready for your review

Hi Zac and Sarah,

The January, February and March sea lice reports are complete and ready for your review.

Summary: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\2019 Farm Level Sea Lice Summary.xlsx

Calculator: \\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\SL Farm Level Calculator 2019.xlsx

Please review the cells highlighted in **yellow** – we have a few concerns of farms only counting once when they should be bi-weekly counts.

Krista Sandberg

Data and Public Reporting Manager | Gestionnaire de données et de rapports publics
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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[illegible]

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Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, May 3, 2019 3:53 PM
To: Paylor, Adrienne
Subject: FW: 2019 sea lice reports ready for your review

Hi Adrienne,

January to March sea lice reports for your review. Please see Sarah's notes below. Note that we have split the category of "Bath treatment" into "Medicinal bath treatment" and "Non-medicinal bath treatment" to differentiate the FW and thermolicer treatments from the H2O2 treatments.

\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\2019 Farm Level Sea Lice Summary.xlsx

Krista Sandberg

Aquaculture Data and Public Reporting Manager |
Gestionnaire de données sur l'aquaculture et de rapports publics
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Cellular | Cellulaire [REDACTED]



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From: McConnachie, Sarah
Sent: May-03-19 2:29 PM
To: Sandberg, Krista
Subject: RE: 2019 sea lice reports ready for your review

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January → Approved

February → Approved

March → Approved

Comments:

- Bare Bluff and Plover Point should've been providing more than single counts since December through to the end of harvest since they were over threshold since that time.
- Split "bath treatment" category into "Medicinal bath treatment" and "non-medicinal bath treatment" to differentiate fw/warm water treatments from pesticide usage such as hydrogen peroxide
- Gore should have sea lice values for January as transfers began Dec 5th
- Yes, we should include counts on the days that SLICE is started (most up to date baseline value)
- It can be assumed that Glacial Creek only had a single count due to [REDACTED] restrictions, but perhaps follow up if pattern is repeated next month and categorize accordingly

Dr. Sarah McConnachie MSc, PhD, DVM

Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada

Aquaculture Environmental Operations - Fish Health
Courtenay, British Columbia
Telephone | Téléphone: 250-703-0929
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Sarah.McConnachie@dfo-mpo.gc.ca



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From: Sandberg, Krista
Sent: April-29-19 2:59 PM
To: Waddington, Zac; McConnachie, Sarah
Subject: 2019 sea lice reports ready for your review

Hi Zac and Sarah,

The January, February and March sea lice reports are complete and ready for your review.

Summary: [\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\2019 Farm Level Sea Lice Summary.xlsx](#)

Calculator: [\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\SL Farm Level Calculator 2019.xlsx](#)

Please review the cells highlighted in **yellow** – we have a few concerns of farms only counting once when they should be bi-weekly counts.

Krista Sandberg

Data and Public Reporting Manager | Gestionnaire de données et de rapports publics
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**Pages 148 to / à 151
are duplicates of
sont des duplicatas des
pages 89 to / à 92**

**Pages 152 to / à 155
are duplicates of
sont des duplicatas des
pages 113 to / à 116**

1442

| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|------------------|------------------|----------|------------|------------------|----------------------------|-------------------------------|--------------------------------|--------------------------------|------------------|---|--|------------|-----|---|
| 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 1 | 0.60 | 1.41 | 1.99 | 0.04 | Harvesting: Count(s) not required (harvesting) | Récolte; Dénombrement(s) non requis (récolte) | 2 | | Exceeded 3-Mar (9.60); Harvest complete 31-Mar, single count likely due to diminished stock |
| 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | 2 | 4.28 | 0.79 | 1.71 | 0.00 | Harvesting | Récolte | 2 | | EXCEEDED 20-Mar (6.83); Harvesting began 1-Apr |
| 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | | | | | | Fallow | Mise en jachère | 2 | | single pen 1-Apr moved to March; changed to yc 2 |
| 1144 | Cermaq Canada | Burdwood | 50.7969 | -126.49581 | 3.3 | 3 | 1.49 | 0.66 | 0.82 | 2.14 | | | 2 | | |
| 458 | Cermaq Canada | Cypress Harbour | 50.83772 | -126.66313 | 3.3 | 2 | 0.75 | 0.63 | 0.93 | 1.53 | | | Blond | | |
| 819 | Cermaq Canada | Cecil Island | 50.85123 | -126.71498 | 3.3 | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | | recent transfer |
| 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 2 | 0.01 | 0.00 | 0.03 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences; les dépasse même | 1 | | 2 counts, 1st 2 pens, single pen 27-Mar moved to April |
| 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 2 | 0.45 | 0.18 | 0.16 | 2.83 | | | 1 | | single pen 1-Apr moved to March |
| 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 3 | 0.02 | 0.00 | 5.25 | 0.25 | | | 1 | | single pen 1-Apr moved to March |
| 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.01 | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | 2nd count not performed - meds |
| 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | 3 | 4.89 | 2.21 | 0.06 | 0.05 | Medicinal bath treatment | Traitement médicamenteux dans un bain | 2 | | EXCEEDED 3-Mar (6.61), 12-Mar (5.51); H202 Mar 11-17 |
| 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 3 | 1.24 | 0.74 | 0.29 | 0.09 | | | 2 | | |
| 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 2 | 0.02 | 0.00 | 0.00 | 0.01 | | | 1 | | single pen 2-Mar not included |
| 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | Sampling methodology does not meet requirements outlined in licence conditions (<4 pens) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins) | 1 | | single pen, recent transfer |
| 1336 | Cermaq Canada | Simmonds Point | 50.87791 | -126.90153 | 3.4 | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | | recent transfer |
| 728 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 3 | 1.29 | 0.75 | 0.07 | 1.00 | | | 2 | | |
| 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0 | | | | | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | | |
| 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.47587 | 2.4 | 2 | 0.03 | 0.02 | 0.02 | 0.28 | | | 1 | | |
| 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 1 | 0.07 | 0.00 | 0.13 | 0.15 | Sampling methodology does not meet requirements outlined in licence conditions (<4 pens) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins) | 1 | | single count, recent transfer |
| 1863 | Grieg Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | 2 | 7.74 | 3.93 | 0.00 | 0.00 | Harvesting: Management action planned (Medicinal bath treatment) | Récolte; Mesure de gestion planifiée (Traitement médicamenteux dans un bain) | 2 | | EXCEEDED 14-Mar (5.43), 30-Mar (10.05); Harvesting began, H202 planned for 6-Apr |
| 1762 | Grieg Seafood BC | Gore | 49.6466 | -126.43167 | 2.4 | 2 | 0.08 | 0.03 | 0.07 | 0.00 | | | 1 | | |
| 1862 | Grieg Seafood BC | Hecate | 49.86799 | -126.7573 | 2.4 | 2 | 0.80 | 0.40 | 0.01 | 0.01 | | | 2 | | |

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|------|-----------------------|----------------------------|----------|------------|-----|------|------|------|------|------|--|---|-------|--|
| 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33953 | 2.4 | 2 | 0.03 | 0.00 | 0.02 | 0.03 | | | 1 | |
| 1825 | Grieg Seafood BC | Noo-Ia | 50.60799 | -126.36501 | 3.3 | 2 | 0.45 | 0.19 | 0.04 | 2.50 | | Dénombrement(s) non requis (<4 bassins) | 2 | |
| 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0 | | | | | Count(s) not required (<4 pens) | | 1 | |
| 746 | Grieg Seafood BC | Site 13 | 49.6291 | -123.84265 | 3.1 | 0 | | | | | Count(s) not required (<4 pens) | | 1 | |
| 1079 | Grieg Seafood BC | Steamer - post treatment | 49.8868 | -126.7911 | 2.4 | 1 | 0.30 | 0.27 | 0.00 | 0.00 | | Traitement médicamenteux dans un bain | 2 | H202 |
| 1079 | Grieg Seafood BC | Steamer - pre-treatment | 49.8868 | -126.7911 | 2.4 | 1 | | 1.75 | 0.52 | 0.00 | Medicinal bath treatment | | 2 | EXCEEDED 4-Mar (4.33) |
| 7273 | Grieg Seafood BC | Isa-ya | 50.61725 | -126.33212 | 3.3 | 2 | 0.48 | 0.23 | 0.25 | 5.53 | | Dénombrement(s) non requis (<4 bassins) | 2 | |
| 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | 0 | | | | | Count(s) not required (<4 pens) | | 1 | |
| 1839 | Grieg Seafood BC | Wa-kwa | 50.60106 | -126.34741 | 3.3 | 2 | 0.30 | 0.16 | 0.78 | 5.57 | | | 1 | single pen 5-Mar not included |
| 1705 | Grieg Seafood BC | Williamson | 49.65623 | -126.42849 | 2.4 | 2 | 0.02 | 0.00 | 0.01 | 0.00 | | | 1 | |
| 7714 | Marine Harvest Canada | Alexander | 52.67648 | -128.57494 | 3.5 | 3 | 0.05 | 0.00 | 0.42 | 0.06 | | | 1 | |
| 1300 | Marine Harvest Canada | Athorpe | 50.47531 | -125.80975 | 3.2 | 3 | 2.99 | 0.84 | 1.35 | 1.11 | In-feed treatment; Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 3 counts, 1st 3rd 2 pens; counts on 19-Mar and 26-Mar not included (post Slice); EXCEEDED 13-Mar (4.38), 26-Mar (3.62); SLICE 11-Mar; changed to yc2 |
| 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 4 | 0.44 | 0.15 | 0.31 | 0.13 | | | 1 | |
| 790 | Marine Harvest Canada | Chancellor Channel | 50.41723 | -125.66284 | 3.2 | 4 | 0.19 | 0.10 | 0.32 | 0.00 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 2nd 4th 2 pens |
| 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 1 | 0.18 | 0.08 | 0.13 | 0.08 | In-feed treatment; Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | Slice 26-Feb. Counts early in month not included |
| 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 4 | 0.46 | 0.12 | 0.10 | 0.02 | | | 2 | |
| 1293 | Marine Harvest Canada | Duncan Island | 50.8195 | -127.55568 | 3.4 | 4 | 0.37 | 0.23 | 0.02 | 0.19 | | | 2 | |
| 7053 | Marine Harvest Canada | GH ya | 50.90078 | -127.93638 | 3.4 | 4 | 0.07 | 0.00 | 0.26 | 0.02 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 4 counts, 2nd 4th 2 pens |
| 3183 | Marine Harvest Canada | Glacial Creek | 50.01008 | -123.90241 | 3.1 | 1 | 0.88 | 0.25 | 0.35 | 0.02 | Count(s) not required (broodstock in spawning year) | Dénombrement(s) non requis (Géniteurs à l'année du frai) | Brood | single count, no explanation |
| 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.4199 | 3.5 | 0 | | | | | Fallow | Mise en jachère | | |
| 1581 | Marine Harvest Canada | Hardwicke - post-treatment | 50.41339 | -125.76974 | 3.2 | 5.00 | | 1.34 | 1.60 | 0.90 | Management action planned (In-feed treatment) | Mesure de gestion planifiée (Traitement administré dans l'alimentation) | 1 | |
| 1581 | Marine Harvest Canada | Hardwicke - pre-treatment | 50.41339 | -125.76974 | 3.2 | 1 | | 3.60 | 2.30 | 0.97 | Mechanical removal treatment | Traitement par retrait mécanique | 1 | EXCEEDED 1-Mar (7.94), 18-Mar (3.40), 23-Mar (3.62), 27-Mar (5.53); Hydrolizer 7-Mar, SLICE planned |
| 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 4 | 0.61 | 0.21 | 0.55 | 0.34 | | | 2 | 2 separate ages of fish; |

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|------|-----------------------|-----------------------------|----------|------------|-----|---|------|------|------|------|---|--|--------|-----------|-----|---|
| 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.89988 | 2.4 | | 0.52 | 0.12 | 2.18 | 0.93 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 1-Nov-18 | 0.3 | 4 counts, 1st 2 pens |
| 143 | Marine Harvest Canada | Larsen Island | 50.60175 | -126.63284 | 3.3 | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | | | smolt entry |
| 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 4 | 0.28 | 0.11 | 0.00 | 0.00 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 19-Dec-17 | 1.2 | 4 counts, 2nd 4th 2 pens |
| 1238 | Marine Harvest Canada | Mahatta West | 50.469 | -127.83538 | 2.4 | 5 | 0.18 | 0.07 | 1.73 | 1.30 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 7-Dec-18 | 0.2 | 5 counts, 1st 3rd 5th 2 pens |
| 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 0 | | | | | Fallow | Mise en jachère | | | | |
| 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 4 | 0.54 | 0.19 | 5.43 | 2.51 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 5-Nov-18 | 0.3 | 4 counts, 2nd 4th 2 pens |
| 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | 4 | 0.20 | 0.10 | 0.02 | 0.02 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 22-Dec-17 | 1.2 | 4 counts, 1st 3rd 2 pens |
| 141 | Marine Harvest Canada | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | 2 | 0.87 | 0.48 | 1.55 | 1.37 | In-feed treatment; Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 2 | 23-Nov-17 | 1.3 | SUICE 11-Mar, 2nd 3rd counts not included, post SUICE; 1st count 2 pens |
| 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | 4 | 0.14 | 0.08 | 0.42 | 0.18 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 15-Mar-19 | 0.0 | 4 counts, 1st 2 pens |
| 1382 | Marine Harvest Canada | Robertson | 50.93155 | -127.42258 | 3.4 | 1 | 0.35 | 0.28 | 0.17 | 0.07 | | | 2 | 24-Feb-18 | 1.1 | single count, no explanation |
| 1059 | Marine Harvest Canada | Sargeaunt Pass | 50.67346 | -126.18595 | 3.3 | 5 | 0.04 | 0.00 | 0.25 | 0.15 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 10-Jan-19 | 1.8 | 5 counts, 2nd 4th 2 pens; |
| 1136 | Marine Harvest Canada | Shaw Point - post-treatment | 50.48527 | -125.88981 | 3.2 | 2 | 1.50 | 1.24 | 0.28 | 0.86 | | | Boysed | | | unspecified treatment for all pens planned for April |
| 1136 | Marine Harvest Canada | Shaw Point - pre-treatment | 50.48527 | -125.88981 | 3.2 | 1 | | 3.20 | 0.14 | 1.98 | Non-medical bath treatment | Traitement non médical au bain | Boysed | 7-Feb-18 | 1.1 | FW bath treatment |

s.20(1)(b)

| | | | | | | | | | | | | | | | | |
|------|-----------------------|---------------|----------|------------|-----|---|------|------|------|------|---|--|---|-----------|-----|---|
| 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 1 | 0.03 | 0.00 | 0.45 | 0.00 | Sampling methodology does not meet requirements outlined in licence conditions (<4 pens) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins) | 2 | 4-May-17 | 1.8 | single count of 2 pens, follow as of 28-Mar |
| 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.5004 | 3.4 | 5 | 0.77 | 0.20 | 1.22 | 0.30 | | | 2 | 24-Feb-18 | 1.0 | |
| 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 4 | 0.36 | 0.21 | 0.00 | 0.07 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 23-Nov-17 | 1.3 | 4 counts, 1sr 3rd 2 pens |
| 465 | Marine Harvest Canada | Swanson | 50.61871 | -126.70473 | 3.3 | 2 | 0.28 | 0.09 | 0.75 | 0.30 | In-feed treatment; Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | 2-Apr-18 | 0.9 | SLICE 24-Feb, counts 4-Mar and 11-Mar not included; one count only 2 pens |
| 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 4 | 0.73 | 0.21 | 1.73 | 0.46 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 3-May-18 | 0.8 | 4 counts, 2nd 4th 2 pens |

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chalinus | monthly farm abundance Calligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|----------------|------------------|----------|------------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|---------------------------------|---------------------------------|---|--|------------|------------|-----|---|
| 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | Clayoquot | 0 | 0.01 | 0.01 | 0.02 | 0.01 | Fallow | Dénombrement(s) non requis (<4 bassins) | 1 | | | single count due to recent transfer |
| 227 | Cermaq Canada | Bawden | 49.30798 | -126.00721 | 2.3 | Clayoquot | 1 | 0.01 | | 0.02 | 0.01 | Count(s) not required (<4 pens) | | | | | EXCEEDED 2-Apr (15.37), 17-Apr (16.41); Harvesting - expected to be empty by end of May |
| 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | Clayoquot | 2 | | 6.89 | 1.84 | 0.03 | Harvesting | Récolte | 2 | | | |
| 1148 | Cermaq Canada | Binns Island | 49.34182 | -125.95328 | 2.3 | Clayoquot | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | SLICE 4-Apr, single count of 2 pens on 27/28 Apr; single pen 2-Apr moved to March |
| 1144 | Cermaq Canada | Burdwood | 50.7969 | -126.49581 | 3.3 | Broughton | 1 | 0.38 | 0.13 | 0.00 | 0.12 | Count(s) not required (<21 days post in-feed treatment) | Dénombrement(s) non effectués (mesure de gestion de la santé) | 2 | | | Medicated feed started 22-Mar |
| 819 | Cermaq Canada | Cecil Island | 50.85123 | -126.71498 | 3.3 | Broughton | 0 | | | | | Count(s) not performed (health management action) | Dénombrement(s) non effectués (mesure de gestion de la santé) | 1 | | | 2 counts of 2 pens; medicated feed started 11-Apr |
| 458 | Cermaq Canada | Cypress Harbour | 50.83772 | -126.66313 | 3.3 | Broughton | 2 | 0.77 | 0.43 | 0.09 | 0.36 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences; les dépasse même | Brood | | | |
| 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | Clayoquot | 2 | 0.26 | 0.02 | 2.00 | 0.56 | | | 1 | | | single pen 25-Apr not included, single pen 27-Mar moved to April |
| 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | Broughton | 2 | 0.51 | 0.12 | 0.52 | 2.11 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences; les dépasse même | 2 | | | single pen 1-Apr moved to March; single pen 2-May moved to April |
| 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | Clayoquot | 2 | 0.13 | 0.01 | 3.07 | 3.51 | | | 1 | | | single pen 1-Apr moved to March |
| 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | Clayoquot | 1 | 0.00 | 0.00 | 0.00 | 0.10 | Count(s) not performed (health management action) | Dénombrement(s) non effectués (mesure de gestion de la santé) | 1 | | | single pens Apr 5 23,27 - all very low so kept as single count; second count not performed due to meds - approve SM |
| 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | Clayoquot | 3 | | 1.41 | 0.24 | 0.07 | | | 2 | | | |
| 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | Discovery | 2 | 1.33 | 0.78 | 0.29 | 0.16 | | | 2 | | | |
| 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | Clayoquot | 2 | 0.05 | 0.02 | 0.06 | 0.03 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences; les dépasse même | 1 | | | 2 counts of 2 pens - not sure why they didn't count 3 full pens |
| 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | Clayoquot | 0 | | | | | Count(s) not performed (health management action) | Dénombrement(s) non effectués (mesure de gestion de la santé) | 1 | | | Data not reporting in initial submission. Maria followed up and they resubmitted saying that they were medicating these fish for mouthrot |
| 1336 | Cermaq Canada | Simmonds Point | 50.87791 | -126.90153 | 3.3 | Broughton | 1 | 0.38 | 0.08 | 2.51 | 0.28 | Count(s) not performed (health management action) | Dénombrement(s) non effectués (mesure de gestion de la santé) | 1 | | | single pen 2-Apr not included; medicated feed starting 22-Apr, single count - could have still done 2 counts? |

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chalmus | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|-----------------------|--------------------|----------|------------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|---|--|------------|------------|-----|--|
| 728 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | Broughton | 0 | | | | | Count(s) not required (<21 days post in-feed treatment) | Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 2 | | | Slice 10-Apr. Seems like they could have done a count at the beginning of the month? |
| 1698 | Grieg Seafood BC | Ahlstrom | 49.7793 | -124.15395 | 3.1 | Sunshine Coast | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | |
| 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | Discovery | 0 | | | | | Fallow | Mise en jachère | 1 | | | |
| 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.47587 | 2.4 | Nootka | 2 | 0.11 | 0.04 | 0.07 | 0.12 | | | 1 | | | |
| 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | Sunshine Coast | 2 | 0.47 | 0.04 | 0.24 | 0.03 | | | 1 | | | |
| 1863 | Grieg Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | Esperanza | 2 | 2.60 | 1.30 | 0.37 | 0.00 | Medicinal bath treatment | Traitement médicamenteux dans un bain | 2 | | | 1st count post H2O2 (10 pens) (0.55); 2nd count 11 days later EXCEEDED (4.65) |
| 1762 | Grieg Seafood BC | Gore | 49.6466 | -126.43167 | 2.4 | Nootka | 2 | 0.10 | 0.03 | 0.08 | 0.02 | | | 1 | | | EXCEEDED 21-Apr (6.63); Harvesting - plan to be empty by end of May |
| 1862 | Grieg Seafood BC | Hecate | 49.86799 | -126.7573 | 2.4 | Esperanza | 2 | 4.12 | 2.16 | 0.06 | 0.05 | Harvesting | Récolte | 2 | | | single pen 9-Apr not included |
| 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33953 | 2.4 | Nootka | 3 | 0.07 | 0.03 | 0.00 | 0.00 | | | 1 | | | |
| 1825 | Grieg Seafood BC | Nootka | 50.60799 | -126.36301 | 3.3 | Broughton | 2 | 1.93 | 0.81 | 0.66 | 0.90 | | | 2 | | | |
| 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | Sunshine Coast | 2 | 0.02 | 0.00 | 0.07 | 0.00 | | | 1 | | | |
| 746 | Grieg Seafood BC | Site 13 | 49.6291 | -123.84265 | 3.1 | Sunshine Coast | 2 | 0.01 | 0.00 | 0.25 | 0.04 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 2 counts of 2 pens |
| 1079 | Grieg Seafood BC | Steamer | 49.8868 | -126.7911 | 2.4 | Esperanza | 2 | 4.12 | 1.38 | 1.28 | 0.02 | | | 2 | | | EXCEEDED 25-Apr (7.55); no management action identified in monthly report - plan to start harvesting in May and be empty by August |
| 7273 | Grieg Seafood BC | Tsa-ya | 50.61225 | -126.33212 | 3.3 | Broughton | 2 | 0.96 | 0.26 | 1.33 | 0.70 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 1st count 6 pens (3 pens 13-Apr, 3 pens 16-Apr) |
| 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | Sunshine Coast | 2 | 0.05 | 0.00 | 0.70 | 0.00 | | | 1 | | | |
| 1839 | Grieg Seafood BC | Wa-kwa | 50.60106 | -126.34741 | 3.3 | Broughton | 2 | 0.39 | 0.09 | 0.25 | 0.54 | | | 1 | | | |
| 1705 | Grieg Seafood BC | Williamson | 49.65623 | -126.42849 | 2.4 | Nootka | 2 | 0.03 | 0.00 | 0.06 | 0.00 | | | 1 | | | |
| 7714 | Marine Harvest Canada | Alexander | 52.67648 | -128.57494 | 3.5 | Central Coast | 3 | 0.51 | 0.04 | 3.48 | 0.73 | | | 1 | | | |
| 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | Discovery | 4 | 0.36 | 0.18 | 0.00 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | single pen 1-Apr not included (post-Slice); 4 counts, 1st 3rd 2 pens |
| 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | Port Hardy | 5 | 0.88 | 0.19 | 0.44 | 0.15 | | | 1 | | | |
| 790 | Marine Harvest Canada | Chancellor Channel | 50.41723 | -125.66284 | 3.2 | Discovery | 5 | 0.48 | 0.19 | 1.21 | 0.10 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 5 counts, 2nd 4th 2 pens |

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance e chalinus | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|-----------------------|--------------------------|----------|------------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|-----------------------------------|--------------------------------|---|--|------------|------------|-----|---|
| 7713 | Marine Harvest Canada | Cougar | 52.71993 | -128.57432 | 3.5 | Central Coast | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | | | |
| 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | Broughton | 6 | 0.14 | 0.04 | 0.16 | 0.18 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 6 counts, 3rd 5th 2 pens |
| 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | Port Hardy | 4 | 0.23 | 0.09 | 0.03 | 0.02 | | | 2 | | | |
| 1293 | Marine Harvest Canada | Duncan Island | 50.8195 | -127.55568 | 3.4 | Port Hardy | 4 | 0.06 | 0.03 | 0.00 | 0.01 | | | 2 | | | |
| 7053 | Marine Harvest Canada | Ghi ya | 50.90078 | -127.93638 | 3.4 | Port Hardy | 4 | 0.40 | 0.09 | 0.21 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 4 counts, 1st 2nd 4th 2 pens |
| 303 | Marine Harvest Canada | Glacial Creek | 50.01008 | -123.90241 | 3.1 | Sunshine Coast | 1 | 0.17 | 0.00 | 0.00 | 0.32 | Count(s) not required (broodstock in spawning year) | Dénombrement(s) non requis (Géniteurs à l'année du frai) | Brood | | | single count due to stress on brood |
| 1581 | Marine Harvest Canada | Hardwicke post-treatment | 50.41339 | -125.76974 | 3.2 | Discovery | 1 | 1.10 | 0.45 | 0.02 | 0.00 | In-feed Treatment | Traitement administré dans l'alimentation | 2 | | | EXCEEDED 5-Apr (4.27); SLICE 8-Apr, pre/post treatment counts |
| 1581 | Marine Harvest Canada | Hardwicke pre-treatment | 50.41339 | -125.76974 | 3.2 | Discovery | 1 | 4.2 | 2.15 | 2.07 | 1.85 | Management action planned (In-feed treatment) | Mesure de gestion planifiée (Traitement administré dans l'alimentation) | 2 | | | |
| 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | Broughton | 2 | 0.00 | 0.00 | 0.00 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 1st count 2 pens |
| 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | Central Coast | 5 | 0.58 | 0.30 | 0.55 | 0.42 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 5 counts, 2nd 2 pens |
| 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | Quatsino | 3 | 0.27 | 0.08 | 2.80 | 2.01 | | | 1 | | | single count on 7-Apr, second count not performed due to moult/trot treatment - as per conversation with KS - approved SM |
| 143 | Marine Harvest Canada | Larsen Island | 50.60775 | -126.63284 | 3.3 | Broughton | 1 | 0.13 | 0.00 | 1.45 | 0.37 | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | | |
| 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | Discovery | 4 | 0.33 | 0.13 | 1.38 | 0.15 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 4 counts, 2nd 4th 2 pens |
| 1238 | Marine Harvest Canada | Mahatta West | 50.469 | -127.83538 | 2.4 | Quatsino | 5 | 0.31 | 0.08 | 1.34 | 1.39 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 5 counts, 2nd 4th 2 pens |

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chlamydia | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|-----------------------|------------------|----------|------------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|----------------------------------|--------------------------------|---|---|------------|------------|-----|---|
| 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | Broughton | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | smolt entry |
| 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | Quatsino | 4 | 0.44 | 0.13 | 2.08 | 2.39 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 4 counts, 2nd 4th 2 pens |
| 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | Discovery | 4 | 0.18 | 0.09 | 0.00 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 4 counts, 1st 3rd 2 pens |
| 141 | Marine Harvest Canada | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | Broughton | 4 | 0.22 | 0.09 | 0.14 | 0.06 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 4 counts, 1st 3rd 2 pens; single pen 30-Apr not included |
| 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | Port Hardy | 4 | 0.15 | 0.04 | 0.68 | 0.11 | | | 1 | | | |
| 1382 | Marine Harvest Canada | Robertson | 50.93155 | -127.42258 | 3.4 | Port Hardy | 3 | 0.13 | 0.09 | 0.00 | 0.00 | | | 2 | | | |
| 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | Broughton | 4 | 0.09 | 0.02 | 0.46 | 0.19 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | 4 counts, 1st 3rd 2 pens |
| 1136 | Marine Harvest Canada | Shaw Point | 50.48527 | -125.88981 | 3.2 | Discovery | 5 | | 1.88 | 2.26 | 0.45 | Management action planned (Non-medical bath treatment) | Mesure de gestion planifiée (Traitement non médical au bain) | Brood | | | FW bath treatment 26-Apr. Did not include pre/post treatment counts because abundance did not drop below threshold and difficult to delineate - approve; some decrease seen by pen but not overall (SM) |
| 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | Port Hardy | 0 | | | | | Fallow | Mise en jachère | | | | |
| 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.5004 | 3.4 | Port Hardy | 4 | 2.68 | 1.10 | 1.50 | 0.46 | Management action planned (Medical bath treatment); Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement médicamenteux dans un bain): La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 4 counts, 2nd 5 pens, 4th 2 pens; H2O2 planned in May once grade harvesting is completed |
| 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | Discovery | 3 | 0.27 | 0.14 | 0.04 | 0.06 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 3 counts, 1st 3rd 2 pens |

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chlamydia | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|-----------------------|------------------|----------|------------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|----------------------------------|--------------------------------|--|---|------------|------------|-----|--|
| 465 | Marine Harvest Canada | Swanson | 50.61871 | -126.70473 | 3.3 | Broughton | 6 | 0.08 | 0.04 | 0.09 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 6 counts, 3rd 5th 2 pens |
| 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | Broughton | 5 | 2.48 | 0.78 | 5.12 | 2.25 | Management action planned (In-feed treatment): Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement administré dans l'alimentation): La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | 5 counts, 2nd 4th 2 pens; EXCEEDED 22-Apr (3.95), 30-Apr (3.12) - NOT REPORTED; Slice ordered for 4-May barge Was sent to SM May 9th, forwarded on to AQFF May 29th by SM |

s.20(1)(b)

| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance male | monthly farm abundance females | monthly farm abundance chilimus | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|----------------|------------------|----------|------------|------------------|-----------------|----------------------------|-----------------------------|--------------------------------|---------------------------------|--------------------------------|--|--|------------|------------|-----|--|
| 227 | Cermaq Canada | Bawden | 49.30798 | -126.00721 | 2.3 | Clayoquot | 1 | 0.13 | 0.00 | 0.13 | 0.10 | In-feed Treatment; Sampling methodology does not meet requirements outlined in licence conditions (<4 pens); Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins); Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | | | count of single pen on 10-May, fish were entered from Ross Apr 18-24; SLICE 12-May (area management for caligus) |
| 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | Clayoquot | 0 | | | | | Count(s) not required (harvesting) | Dénombrement(s) non requis (récolte) | 2 | | | |
| 1148 | Cermaq Canada | Bims Island | 49.34182 | -125.95328 | 2.3 | Clayoquot | 1 | 0.07 | 0.02 | 0.00 | 0.00 | In-feed Treatment; Sampling methodology does not meet requirements outlined in licence conditions (<4 pens); Count(s) not required (<21 days post in-feed treatment) | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (< 4 bassins); Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | | | single count of 2 pens 7-May, fish entered from Dixon April 25-30; SLICE 20-May (area management for caligus) |
| 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | Clayoquot | 2 | 0.07 | 0.01 | 0.25 | 0.62 | In-feed Treatment; Sampling methodology does not meet requirements outlined in licence conditions (health management action) | Traitement administré dans l'alimentation; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (mesure de gestion de la santé) | 1 | | | 2 counts of 2 pens with weird dates (May 1/8, 12/13). No reason why full count of 3 pens couldn't be done?; SLICE 19-May (area management for caligus); Not sure what to put for comment as to why full 3 pens were not counted? |
| 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | Clayoquot | 0 | | | | | Count(s) not performed; Follow up actions taken | Dénombrement(s) non effectués; Mesures de suivi prises | 1 | | | SLICE 5-May, no counts performed before or after treatment - |
| 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | Clayoquot | 1 | 0.07 | 0.07 | 0.02 | 0.25 | Sampling methodology does not meet requirements outlined in licence conditions (health management action); Count(s) not performed (health management action) | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (mesure de gestion de la santé); Dénombrement(s) non effectués (mesure de gestion de la santé) | 1 | | | single count of 2 pens 18-May, could have completed second count earlier in month?; Florfenicol 3-May, 19-May, issues with plankton and mouthrot |
| 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | Clayoquot | 2 | 6.86 | 3.91 | 0.21 | 0.02 | Harvesting | Récolte | 2 | | | EXCEEDED 15-May (9.52), 30-May (4.20); Harvest complete 11-Jun |
| 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | Clayoquot | 1 | 0.04 | 0.00 | 0.08 | 0.00 | Count(s) not required (<21 days post in-feed treatment) | Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 1 | | | single pen 1-May moved to April; Single count 14-May, could have completed second count earlier in month?; SLICE completed 18-May (area management for caligus) |

s.20(1)(b)
s.21(1)(b)

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|------|------------------|----------------------------|----------|------------|-----|-----------|---|------|------|--------------|--------------|---|--|---|---|
| 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | Clayoquot | 2 | 0.09 | 0.00 | 0.04 | 0.01 | Sampling methodology does not meet requirements outlined in licence conditions. Follow up actions taken | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | 2 counts of only 2 pens, single pen 16-May not included - no reason stated for why they couldn't count a full 3 pens. Howie Need to determine comment |
| 1738 | Grieg Seafood BC | Atrevida | 49.65603 | -126.45404 | 2.4 | Nootka | 3 | 0.13 | 0.05 | 0.06 | 0.02 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | 3 counts, 2nd 2 pens |
| 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.47587 | 2.4 | Nootka | 2 | 0.17 | 0.06 | 0.08 | 0.43 | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | single count 22-May not included; challimus and caligus not counted |
| 1863 | Grieg Seafood BC | Esperanza - post-treatment | 49.87814 | -126.76145 | 2.4 | Esperanza | 1 | 1.63 | 1.63 | not reported | not reported | Medicinal bath treatment; Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Traitement médicamenteux dans un bain; Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | Issue with dates. Howie contacting. EXCEEDED 7 May (16:05)- H2O2 2.1 May; challimus and caligus not counted |
| 1762 | Grieg Seafood BC | Gore | 49.64466 | -126.43167 | 2.4 | Nootka | 2 | 0.15 | 0.10 | 0.09 | 0.00 | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | post-H2O2 count only 2 pens, likely due to harvesting; challimus and caligus not counted |
| 1862 | Grieg Seafood BC | Hecate - post-treatment | 49.86799 | -126.7573 | 2.4 | Esperanza | 1 | 2.65 | 2.53 | not reported | not reported | Medicinal bath treatment; Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Traitement médicamenteux dans un bain; Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | EXCEEDED 11-May (18:07); H2O2 17-May; challimus and caligus not counted |
| 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33953 | 2.4 | Nootka | 3 | 0.13 | 0.07 | 0.00 | 0.01 | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | single pen counted 15-May not included (1:05), post-treatment count completed 29-May, due to low DO? if they had counted more pens immediately post-treatment then their post-treatment count would not have been so high; Did they do another H2O2 treatment in June? could add to comments; challimus and caligus not counted |
| 1079 | Grieg Seafood BC | Steamer - post-treatment | 49.88669 | -126.7911 | 2.4 | Esperanza | 1 | 8.33 | 6.25 | not reported | not reported | Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | |

s.20(1)(b)
s.21(1)(b)

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|------|------------------|-------------------------|----------|------------|-----|----------------|---|-------|--------------|--------------|---|--|-------|---|
| 1079 | Grieg Seafood BC | Steamer - pre-treatment | 49.8868 | -126.7911 | 2.4 | Esperanza | 1 | 14.17 | not reported | not reported | Medicinal bath treatment; Harvesting; Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | Traitement médicamenteux dans un bain; Récolte; La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 2 | EXCEEDED 9-May (31.8); H2O2 15-May; chaulimus and caligus not counted |
| 1705 | Grieg Seafood BC | Williamson | 49.65623 | -126.42849 | 2.4 | Nootka | 1 | 0.13 | 0.05 | 0.03 | Sampling methodology does not meet requirements outlined in licence conditions; Follow up actions taken | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis; Mesures de suivi prises | 1 | single pen 7-May not included; 2nd count 23-May only 2 pens - only 3 pens counted in total, did not perform 2 full events, no indication why- |
| 144 | MOWI Canada West | Koskimo | 50.45861 | -127.88988 | 2.4 | Quatsino | 5 | 0.22 | 0.05 | 2.58 | 1.83 | | 1 | |
| 1238 | MOWI Canada West | Melhatta West | 50.469 | -127.88538 | 2.4 | Quatsino | 4 | 0.23 | 0.08 | 0.68 | 0.85 | | 1 | 4 counts, 1st and 3rd 2 pens |
| 1237 | MOWI Canada West | Monday Rocks | 50.48588 | -127.87584 | 2.4 | Quatsino | 5 | 0.37 | 0.11 | 2.32 | 1.64 | | 1 | 5 counts, 2nd 4th 2 pens |
| 1698 | Grieg Seafood BC | Ahlstrom | 49.7793 | -124.15395 | 3.1 | Sunshine Coast | 1 | 0.15 | 0.00 | 0.23 | 0.15 | | 1 | recent entry from Gold River Hatchery, single count 31-May |
| 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | Sunshine Coast | 2 | 0.19 | 0.03 | 0.35 | 0.29 | | 1 | single count 26-May, fish entered from Gold River early March, no reason provided for why first count was not completed - or environmental? |
| 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | Sunshine Coast | 1 | 0.00 | 0.00 | 0.00 | 0.00 | | 1 | |
| 746 | Grieg Seafood BC | Site 13 | 49.6251 | -123.84265 | 3.1 | Sunshine Coast | 1 | 0.03 | 0.00 | 0.23 | 0.10 | | 1 | single count of 2 pens, harmful algae bloom |
| 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | Sunshine Coast | 2 | 0.13 | 0.01 | 0.58 | 0.08 | | 1 | |
| 303 | MOWI Canada West | Glacial Creek | 50.01008 | -123.90241 | 3.1 | Sunshine Coast | 0 | | | | | | Brood | |
| 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | Discovery | 2 | 1.57 | 0.91 | 0.07 | 0.08 | | 2 | |
| 1300 | MOWI Canada West | Althorpe | 50.47531 | -125.80975 | 3.2 | Discovery | 6 | 0.22 | 0.08 | 1.31 | 0.34 | | 1 | 6 counts, 1st 3rd 2 pens, 4th 4 pens |

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s.21(1)(b)

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|------|------------------|-----------------------------|----------|------------|-----|-----------|---|------|------|------|------|---|--|-------|--|
| 790 | MOWI Canada West | Chancellor Channel | 50.41723 | -125.86284 | 3.2 | Discovery | 4 | 1.85 | 0.60 | 1.74 | 0.22 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 1st 2nd 3rd 2 pens - not actually 2 full events; EXCEEDED 27-May (3.08) |
| 1581 | MOWI Canada West | Hardwicke | 50.41339 | -125.76974 | 3.2 | Discovery | 3 | 0.26 | 0.14 | 0.01 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 3 counts, 3rd 2 pens |
| 100 | MOWI Canada West | Lees Bay | 50.41063 | -125.70029 | 3.2 | Discovery | 5 | 1.13 | 0.47 | 2.37 | 0.22 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 3rd 4th 2 pens |
| 78 | MOWI Canada West | Phillips Arm | 50.48825 | -125.35658 | 3.2 | Discovery | 5 | 0.09 | 0.04 | 0.14 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 4th 2 pens |
| 1136 | MOWI Canada West | Shaw Point - post-treatment | 50.48527 | -125.88981 | 3.2 | Discovery | 4 | 1.15 | 0.57 | 0.10 | 0.02 | | | Breed | FW bath, did my best to separate out pre/post treatment counts; EXCEEDED 10-May (10 pen count) |
| 1136 | MOWI Canada West | Shaw Point - pre-treatment | 50.48527 | -125.88981 | 3.2 | Discovery | 1 | | 1.18 | 2.01 | 1.03 | Non-medical bath treatment | Traitement non médical au bain | Breed | |
| 380 | MOWI Canada West | Sonora Point | 50.42362 | -125.90517 | 3.2 | Discovery | 5 | 0.27 | 0.11 | 0.37 | 0.13 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 5 counts, 2nd 4th 2 pens |
| 1144 | Cermaq Canada | Birdwood | 50.7969 | -126.49581 | 3.3 | Broughton | 3 | 0.23 | 0.09 | 0.02 | 0.11 | | | 2 | single pen 31-May moved to June |
| 819 | Cermaq Canada | Cecil Island | 50.85123 | -126.71498 | 3.3 | Broughton | 2 | 0.07 | 0.00 | 0.01 | 0.68 | | | 1 | single pen 31-May moved to June |
| 458 | Cermaq Canada | Cypress Harbour | 50.83772 | -126.86313 | 3.3 | Broughton | 1 | 2.75 | 1.27 | 1.99 | 0.03 | In-feed Treatment | Traitement administré dans l'alimentation | Breed | SLICE 16-May, single pen 25-May not included |
| 869 | Cermaq Canada | Maude Island | 50.85771 | -126.75743 | 3.3 | Broughton | 2 | 0.18 | 0.08 | 0.07 | 0.46 | | | 2 | single pen 2 May moved to April |
| 1336 | Cermaq Canada | Simmonds Point | 50.87791 | -126.90153 | 3.3 | Broughton | 1 | 0.34 | 0.11 | 7.69 | 0.14 | In-feed Treatment | Traitement administré dans l'alimentation | 1 | SLICE 25-May, only 1 count 13-May, could have done 27 What comment to use for why 2nd count wasn't performed? |
| 728 | Cermaq Canada | Sir Edmund Bay | 50.83086 | -126.59684 | 3.3 | Broughton | 3 | 0.95 | 0.48 | 0.01 | 0.00 | | | 2 | single pen 31-May moved to June |
| 1825 | Grig Seafood BC | Noo-la - post-treatment | 50.60799 | -126.36501 | 3.3 | Broughton | 1 | 0.36 | 0.22 | 0.00 | 0.00 | | | 2 | SLICE 7-May, 2nd count not included (post-Slice) |
| 1825 | Grig Seafood BC | Noo-la - pre-treatment | 50.60799 | -126.36501 | 3.3 | Broughton | 1 | 2.48 | 1.37 | 0.08 | 0.96 | In-feed Treatment | Traitement administré dans l'alimentation | 2 | |
| 7273 | Grig Seafood BC | Tsa-ya | 50.61225 | -126.33212 | 3.3 | Broughton | 2 | 0.59 | 0.23 | 0.13 | 0.56 | | | 2 | |
| 1839 | Grig Seafood BC | Wa-kwa | 50.60106 | -126.34741 | 3.3 | Broughton | 2 | 0.42 | 0.11 | 0.05 | 0.52 | | | 2 | |
| 1586 | MOWI Canada West | Doctor Islets | 50.65373 | -126.28925 | 3.3 | Broughton | 4 | 0.06 | 0.02 | 0.26 | 0.17 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | 4 counts, 1st 3rd 2 pens; initial sw entry 9-May, changed to y2 |
| 1618 | MOWI Canada West | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | Broughton | 3 | 0.03 | 0.01 | 4.38 | 0.10 | | | 1 | 3 counts, 1st 3rd 2 pens, not actually 2 full counts; high chlamus |

s.20(1)(b)

s.21(1)(b)

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|------|------------------|--------------------------------|----------|------------|-----|---------------|---|------|------|------|------|---|---|--|--|
| 143 | MOWI Canada West | Larsen Island | 50.60175 | -126.63284 | 3.3 | Broughton | 4 | 0.18 | 0.04 | 0.39 | 0.08 | | 1 | | 4 counts, 4th 2 pens |
| 467 | MOWI Canada West | Midsummer | 50.65784 | -126.66298 | 3.3 | Broughton | 2 | 0.19 | 0.01 | 0.75 | 0.71 | Sampling methodology does not meet requirements outlined in licence conditions (health management action) | 1 | La méthodologie d'échantillonnage ne répond pas aux exigences mentionnées dans les conditions de permis (mesure de gestion de la santé) | 2 counts, 2nd count 4 days after 1st (17-May) and only 2 pens - mouthbroat treatment at end of month |
| 141 | MOWI Canada West | Port Elisabeth | 50.67099 | -126.47653 | 3.3 | Broughton | 3 | 0.08 | 0.04 | 0.00 | 0.04 | | 2 | | |
| 1059 | MOWI Canada West | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | Broughton | 5 | 0.45 | 0.07 | 3.03 | 0.67 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | 1 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 5 counts, 1st 3rd 5th 2 pens; initial sw entry Jan-19, changed to ycl1 |
| 465 | MOWI Canada West | Swanson | 50.61871 | -126.70473 | 3.3 | Broughton | 5 | 0.04 | 0.00 | 0.64 | 0.11 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | 2 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 5 counts, 3rd 2 pens |
| 739 | MOWI Canada West | Upper Retreat | 50.72183 | -126.5681 | 3.3 | Broughton | 0 | | | | | Count(s) not required (<4 pens) | 1 | Dénombrement(s) non requis (<4 bassins) | |
| 820 | MOWI Canada West | Wicklow Point - post-treatment | 50.78659 | -126.69153 | 3.3 | Broughton | 1 | 0.42 | 0.12 | 0.00 | 0.08 | | 2 | | |
| 820 | MOWI Canada West | Wicklow Point - pre-treatment | 50.78659 | -126.69153 | 3.3 | Broughton | 1 | | 1.25 | 9.73 | 3.53 | In-feed Treatment | 2 | Traitement administré dans l'alimentation | EXCEEDED 6-May (5.38); SLICE 6-May |
| 892 | MOWI Canada West | Bell Island | 50.83242 | -127.52057 | 3.4 | Port Hardy | 5 | 0.66 | 0.22 | 0.27 | 0.11 | | 1 | | |
| 1288 | MOWI Canada West | Dorlie Island | 50.81456 | -127.48698 | 3.4 | Port Hardy | 2 | 0.10 | 0.05 | 0.49 | 0.00 | | 2 | | |
| 1293 | MOWI Canada West | Duncan Island | 50.81395 | -127.55568 | 3.4 | Port Hardy | 5 | 0.07 | 0.05 | 0.63 | 0.03 | | 2 | | |
| 7053 | MOWI Canada West | Ghiya | 50.90078 | -127.93638 | 3.4 | Port Hardy | 5 | 0.62 | 0.23 | 1.70 | 0.21 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | 1 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 5 counts, 2nd 4th 2 pens |
| 1198 | MOWI Canada West | Baynor | 50.89253 | -127.25359 | 3.4 | Port Hardy | 5 | 0.50 | 0.17 | 1.59 | 0.68 | | 1 | | |
| 1362 | MOWI Canada West | Robertson | 50.93155 | -127.42758 | 3.4 | Port Hardy | 2 | 0.18 | 0.14 | 0.19 | 0.06 | | 2 | | |
| 831 | MOWI Canada West | Shelter Pass | 50.88414 | -127.5004 | 3.4 | Port Hardy | 4 | | 1.75 | 1.19 | 0.37 | Management action planned (In-feed treatment) | 2 | Mesure de gestion planifiée (traitement administré dans l'alimentation) | 4 counts, 2nd 4th 2 pens; EXCEEDED 12-May (3.55), 19-May (4.32), SLICE ordered for early June |
| 7714 | MOWI Canada West | Alexander | 52.67648 | -128.57894 | 3.5 | Central Coast | 3 | 0.27 | 0.04 | 5.01 | 1.64 | | 1 | | |
| 7713 | MOWI Canada West | Cougar | 52.71993 | -128.57432 | 3.5 | Central Coast | 2 | 0.28 | 0.02 | 1.48 | 0.22 | | 1 | | |
| 1691 | MOWI Canada West | Kid Bay | 52.80048 | -128.40111 | 3.5 | Central Coast | 4 | 0.67 | 0.30 | 0.17 | 0.12 | | 2 | | single pen 15-May not included |

s.20(1)(b)

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Tuesday, May 14, 2019 9:46 AM
To: Manchester, Howie; Waddington, Zac; Sandberg, Krista; McConnachie, Sarah
Cc: Taekema, Bernie John
Subject: FW: Ltr from Ecojustice to Minister Wilkinson - re sea lice on BC salmon farms
Attachments: 2019 05 13 - Ltr from Ecojustice to Minister Wilkinson - re sea lice onpdf

FYI. We can anticipate a required response coming from the minister's office soon.

From: [REDACTED]
Sent: May-13-19 4:07 PM
To: Delaney, Paula; Brenda.McCorquodale@dfo-mpo.gc.ca; McConnachie, Sarah; Paylor, Adrienne
Subject: FW: Ltr from Ecojustice to Minister Wilkinson - re sea lice on BC salmon farms

Good afternoon,

I am forwarding the attached letter to you because you were listed as alternative contacts in auto-response emails from either Ms. Webb or Dr. Waddington.

Regards,

[REDACTED]

From: [REDACTED]
Sent: Monday, May 13, 2019 4:00 PM
To: 'min@dfo-mpo.gc.ca' <min@dfo-mpo.gc.ca>
Cc: 'Andrew.Thomson@dfo-mpo.gc.ca' <Andrew.Thomson@dfo-mpo.gc.ca>; 'Allison.Webb@dfo-mpo.gc.ca' <Allison.Webb@dfo-mpo.gc.ca>; 'Zac.Waddington@dfo-mpo.gc.ca' <Zac.Waddington@dfo-mpo.gc.ca>; 'Ian.Keith@dfo-mpo.gc.ca' <Ian.Keith@dfo-mpo.gc.ca>; 'Neil.Jensen@dfo-mpo.gc.ca' <Neil.Jensen@dfo-mpo.gc.ca>; [REDACTED]
Subject: Ltr from Ecojustice to Minister Wilkinson - re sea lice on BC salmon farms

Dear Minister Wilkinson,

Please find attached a letter of today's date drafted on behalf of [REDACTED] regarding the Department of Fisheries and Oceans ("DFOs") efforts to address excessive sea lice infection on BC-based salmon farms.

In short, through the *Access to Information Act* ("ATIA") [REDACTED] has obtained communications between DFO officials that confirm the Conditions of Licence for farms are ineffectual in addressing excessive sea lice infection on farms. The communications also suggest infected farmed Atlantic salmon are being transferred from one region to another, likely without consideration of the potential impact on the wild salmon populations migrating past receiving farms.

We look forward to receiving your (or a DFO representative's) response to the questions set out in the letter.

Sincerely,

s.19(1)

[REDACTED]
Barrister & Solicitor | Ecojustice
390 - 425 Carrall Street, Vancouver, BC V6B 6E3
T: 604-685-5618 | 1-800-926-7744 ext. [REDACTED]
C: [REDACTED]
F: 604-685-7813
[REDACTED]

This email, including any attachments, is confidential and may be protected by solicitor-client privilege. It is intended only for the use of the person or persons to whom it is addressed. If you have received this communication in error, please destroy the email immediately and notify me by telephone or by email.

s.19(1)

VANCOUVER CALGARY TORONTO OTTAWA HALIFAX



May 13, 2019

Sent via email: min@dfp-mpo.gc.ca

Department of Fisheries and Oceans Canada
Justice Building, Suite 9
House of Commons
Ottawa, Ontario, K1A 0A6

Suite #390, 425 Carrall Street
Vancouver, BC, V6B 6E3
Tel: 604-685-5618 ext. [REDACTED]
Email: [REDACTED]

Suite #390, 425 Carrall Street
Vancouver, BC, V6B 6E3
Tel: 604-685-5618 ext. [REDACTED]
Email: [REDACTED]

**Attention: The Honourable Minister Jonathan Wilkinson, Minister of Fisheries, Oceans
and the Canadian Coast Guard**

Dear Minister Wilkinson,

Re: Addressing sea lice outbreaks on salmon farms in British Columbia

We write on behalf of [REDACTED] to request information about how sea lice (*Lepeoptheirus salmonis*) infection on salmon farms in British Columbia is considered and addressed.

[REDACTED] has obtained information that Department of Fisheries and Oceans ("DFO") officials are of the opinion that the Conditions of Licence ("COLs") regarding excess sea lice numbers are unenforceable and thus they are prevented from ensuring meaningful action is taken to protect wild salmon when sea lice on BC-based salmon farms exceed allowable limits. This is highly concerning [REDACTED] – and should be for you, too – because it meant responses to outbreaks in 2017 and 2018 were inadequate, and a similar dynamic appears to be underway in 2019.

The same information obtained [REDACTED] suggests that excessive sea lice infection is not considered when issuing transfer licences for farmed fish under s. 56 of the *Fishery (General) Regulations* ("FGRs"). Again, such a practice would be highly concerning – drug resistance in sea lice appears to be on the rise in BC and thus impacts of sea lice infection for wild salmon migrating passed destination farms may be severe, especially for juveniles from at-risk Conservation Units.

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We request that you respond to this letter by addressing the following questions:

1. Do you plan on amending the COLs so that the restriction on the number of lice allowed per farm salmon is enforceable? DFO officials find the current conditions ineffective and they have on multiple occasions requested that the conditions be modified.
2. Can you please explain if and how drug resistance in sea lice is considered prior to issuing transfer licences for farmed fish moving between marine sites under s. 56 of the *FGRs*?

Background

Serious sea lice outbreaks on BC farms in three different regions in the last three years

The direct relationship between the number of sea lice per farm salmon and lethal sea louse infection of juvenile wild salmon in BC is well-established in the scientific literature.¹

██████████ has been examining young wild salmon that migrate past open-net fish farms along BC's coast. While lice were successfully suppressed on salmon farms for a period of time after ██████████ raised the issue in 2001, public reporting and internal DFO correspondence has revealed a disturbing trend; farms are increasingly unable to control their sea lice, and DFO veterinarians and officials are unable to require companies to control lice, or prohibit husbandry considered high-risk to wild salmon.

In 2017, there were drug resistant sea lice outbreaks on farms located in Nootka Sound in Mowachaht, Muchalaht, Nuchatlaht, and Ehattesaht territories. In 2018, there was a drug resistant lice outbreak in Clayoquot Sound farms in Ahousaht territory. And in April of this year, in addition to hearing that sea lice levels are again lethally high on wild salmon in Clayoquot Sound, ██████████ found 90% juvenile infection near two salmon farms in the Broughton Archipelago in Musgamagw Dzawada'enuxw territory.

██████████ is very concerned because the April sea louse prevalence levels in the Burdwood Island region, central to the Broughton Archipelago, have returned to the original 2001 levels

¹ See e.g., Krkosek, M., Connors, B. M., Ford, H. Peacock, S., Mages, P., Ford, J. S., Morton, A., Volpe, J. P. Hilborn, R. Dill, L. M. Lewis, M. A. 2011. Fish farms, parasites, and predators: Implications for salmon population dynamics. *Ecological Applications* 21:897–914;

Krkosek, M., J.S. Ford, A. Morton, S. Lele, R.A. Myers, and M.A. Lewis. 2007. Declining Wild Salmon Populations in Relation to Parasites from Farm Salmon. *Science* 14 December 2007: Vol. 318. no. 5857, pp. 1772 - 1775. DOI: 10.1126/science.1148744;

Krkosek, M., M.A. Lewis, A. Morton, L.N. Frazer, and J.P. Volpe. 2006. Epizootics of wild fish induced by farm fish. *Proceedings of the National Academy of Sciences*. PNAS published October 4, 2006, 10.1073/pnas.0603525103; Morton, A.B., and Routledge, R. 2005. Mortality rates for juvenile pink *Oncorhynchus gorbuscha* and chum *O. keta* salmon infested with sea lice *Lepeophtheirus salmonis* in the Broughton Archipelago. *Alaska Fishery Research Bulletin* 11(2):146-152.

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which precipitated the Broughton Pink Salmon population crash of 2002 (see reporting in Provincial Pink Salmon Action Plan). This crash triggered the development of the current sea lice restrictions on farm salmon.

Salmon farm Conditions of Licence are unenforceable and thus do not ensure appropriate actions are taken to protect wild salmon from salmon farm sea louse outbreaks

Adding to [REDACTED] concern is DFO's apparent inability to ensure that salmon farm husbandry does not put wild salmon at further risk from sea lice. For example, DFO officials were unable to require Cermaq to empty a farm in Clayoquot Sound prior to the 2018 juvenile wild salmon migration, despite instructing the company to do so.² Nor were they able to stop Grieg Seafood from sending fish infected with drug resistant sea lice into a farm in the Broughton Archipelago³ and for processing at the Browns Bay packing plant where live lice were released into the Discovery Islands area.⁴

Materials provided pursuant to the *Access to Information Act* ("ATIA") clearly demonstrate that COLs are not strong enough to ensure protection of wild salmon, in accordance with your mandate. We have attached excerpts of these ATIA materials for your reference.

It appears that the COLs only require fish farm operators to develop, follow, and report on a "plan" to address a sea lice outbreak, with no requirement that the "plan" successfully reduce the number of sea lice in salmon farms.⁵

DFO officials' frustration with their inability to address sea lice outbreaks through the COLs is captured by a May 2018 email between DFO Conservation and Protection officials. In that email a DFO Fishery Officer states:

C&P staff looked at this COL in the past and recommended a change as it was not viewed as enforceable. As I understand it, despite the recommendation, no changes were made to the COL and the current wording became fixed for the duration of the licence. A major limitation of the multi-year licences is that COLs may not be amended except for "the purposes of the conservation and protection of fish" (Fishery (General) Regulations, sec. 22(2)). This issue came up last year with an issue of large numbers of sea lice at Grieg on the West coast of Vancouver Island and C&P was asked investigate. However, the only thing that a company can be compelled or held legally accountable for is "implementing a plan" – whatever that means. There is no measure of quantifiable action that we can determine happened or not. As long as the company

² Appendix, Tab 1, Email from Dr. Ian Keith to unknown, sent on May 11, 2018, at 4:02 pm, ATIP A-2018-00799 at pp 235-236.

³ Appendix, Tab 2, Email from Dr. Ian Keith to Adrienne Paylor, sent January 27, 2017, at 1:56 pm, ATIP A-2018-00799 at p 94.

⁴ Appendix, Tab 3, Email from Dr. Ian Keith to Dr. Zac Waddington et al, sent on July 20, 2017, at 11:19 am, ATIP A-2018-00799 at pp 235

⁵ Appendix, Tab 4, Email from Claire Doucette to Michelle Rainer et al., sent on May 14, 2018, at 1:12 pm, ATIP A-2018-00799 at p 615.

has a plan and implements it, they are in compliance of the COL. For example, if they discover the sea lice and ordered up hydrogen peroxide treatments and a well boat, but it will take 6 months in order to reduce the number of sea lice, they would be compliant. REDACTED The only avenue that I can recommend is that you try to convince Allison REDACTED that the COL needs to be changed for conservation and protection reasons (for wild fish)... C&P staff would be happy to help you develop an enforceable COL".⁶

It appears transfer licences are being issued for infected farmed salmon

The same ATIA materials suggest that one way that fish farms are addressing sea lice treatment resistance is to transfer infected fish to another farm or send infected fish for processing. For example, according to the materials provided, in 2016-2017 Grieg Seafood transferred infected fish from the Nootka Sound region to the Broughton Archipelago (from the Steamer Point farm, where drug resistance was occurring in sea lice, to the Noo-la farm site)⁷ and to the Discovery Islands region for processing. This latter transfer was authorized despite strong objections from one of your veterinarians, who responded emphatically that "...the resistant lice should not move from the west to east coast".⁸ The veterinarian's warnings were ignored on two counts and this was followed by a confirmation that the sea lice eggs in the fish processing effluent were alive and hatching, resulting in a drug resistant lice pouring into the largest wild salmon migratory corridor in BC.⁹

As you are aware, s. 56 of the *FGRs* permits you to issue a transfer licence for farmed fish only if:

- (a) the release or transfer of the fish would be in keeping with the proper management and control of fisheries;
- (b) the fish do not have any disease or disease agent that may be harmful to the protection and conservation of fish; and
- (c) the release or transfer of the fish will not have an adverse effect on the stock size of fish or the genetic characteristics of fish or fish stocks (underlining added).

Given scientists, including those employed by DFO, have confirmed (i) sea lice are a pathogen,¹⁰ and (ii) sea lice from salmon farms can cause significant harm to juvenile wild salmon,¹¹ it appears that none of the s.56 conditions could be met with respect to transfers of fish carrying high loads of drug resistant lice.

⁶ Appendix, Tab 5, Email from Neil Jensen to Claire Doucette et al., sent on May 17, 2018, at 9:05 am, ATIP A-2018-00799 at pp 626-627 (underlining added).

⁷ Appendix, Tab 2, Email from Dr. Ian Keith to Adrienne Paylor, sent January 27, 2017, at 1:56 pm, ATIP A-2018-00799 at 94.

⁸ Appendix, Tab 3, Email from Dr. Ian Keith to Dr. Zac Waddington et al, sent on July 20, 2017, at 11:19 am, ATIP A-2018-00799 at pp 235.

⁹ *Ibid.*

¹⁰ See e.g., <https://www.ncbi.nlm.nih.gov/pubmed/15463234>; <http://www.dfo-mpo.gc.ca/aquaculture/rp-pr/acrdp-pcrda/projects-projets/15-1-M-01-eng.html>.

¹¹ See e.g., <http://www.dfo-mpo.gc.ca/aquaculture/publications/infographics-infographie/lice-pou-eng.html>

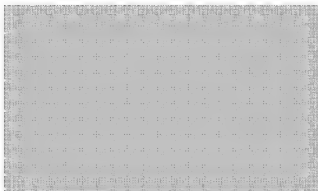
Summary

[REDACTED] is concerned that the COLs issued to salmon farming companies are grossly inadequate to protect wild salmon. With climate change already exacerbating sea louse reproduction on farm salmon through increased water temperatures and salinity, it is more pertinent than ever that you equip your officials with robust and enforceable regulatory tools to protect wild salmon. In fact, if Cermaq is accurate with its sea lice counts in the Broughton Archipelago and has captured lice levels on the poor performers in their farms, then the evidence strongly suggests you will have to lower allowable lice limits on farm salmon to maintain wild salmon populations that migrate past salmon farms.

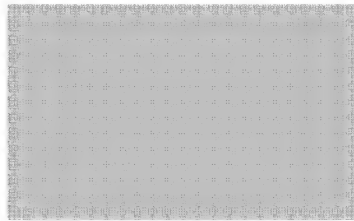
Two immediate tools at your disposal to address this issue appear to be (i) amending the fish farm COLs to provide your officials with greater enforcement powers,¹² and (ii) complying with the transfer provisions of the *FGRs*, which *two* Federal Court judgments have now confirmed requires conformity with the precautionary principle.¹³

In sum, we request that you answer the two specific questions set out above and more generally explain how the COLs and s.56 of the *FGRs* are being used to ensure BC's wild salmon stocks – which are increasingly recommended for listing under COSEWIC as threatened and endangered – are being protected from sea lice infection on farms.

Respectfully,



Barrister & Solicitor



Barrister & Solicitor

cc. Andrew Thomson, DFO Regional Director, Andrew.Thomson@dfo.mpo.gc.ca
Allison Webb, DFO Director, Aquaculture Management, Allison.Webb@dfo.mpo.gc.ca
Dr. Zac Waddington, DFO Lead Veterinarian, Zac.Waddington@dfo-mpo.gc.ca
Dr. Ian Keith, DFO Field Operations Veterinarian, Ian.Keith@dfo.mpo.gc.ca
Neil Jensen, DFO Senior Compliance Officer, Neil.Jensen@dfo.mpo.gc.ca

¹² Section 22(2) of the *Fishery (General) Regulations* empowers you to amend the conditions of a licence “for the purposes of the conservation and protection of fish”.

¹³ *Morton v Canada (Fisheries and Oceans)*, 2015 FC 575; *Morton v Canada (Fisheries and Oceans)*, 2019 FC 143.

Appendix

Tab 1 – Email from Dr. Ian Keith to unknown, sent on May 11, 2018, at 4:02 pm, ATIP A-2018-00799 at pp 235-236

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Tab 5 – Email from Neil Jensen to Claire Doucette et al., sent on May 17, 2018, at 9:05 am, ATIP A-2018-00799 at pp 626-627

TAB 1

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Please provide any information and/or documents to address the questions or that will assist in our assessment of compliance regarding this issue. I look forward to hearing from you by May 18, 2018. If you have any questions or required further clarification please do not hesitate to contact Zac Waddington at 250-703-0902 or Ian Keith at 250-703-0917.

Thanks for your attention concerning this issue.

Regards,
Ian

Dr. Ian Keith DVM
Field Operations Veterinarian – Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Fisheries Management
Aquaculture Management Division | Gestion de l'aquaculture
Aquaculture Environmental Operations – Fish Health
#103 – 2435 Mansfield Drive
Courtenay, British Columbia V9N 2M2
Telephone | Téléphone: 250-703-0917
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Fax | Télécopieur: 250-703-0921
Ian.Keith@dfo-mpo.gc.ca

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s.16(2)(c)

TAB 2

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Keith, Ian

From: Keith, Ian
Sent: January-27-17 1:56 PM
To: Paylor, Adrienne
Subject: FW: Esperanza
Attachments: Esperanza Inlet Jan2017.doc

This letter is in the style suggested by Sonja, although hers, [REDACTED] would read better.

The two pieces that I might include in a letter: to soften the blow of their reality:

- DFO would meet with MOE, government to government, to ask that hydrogen peroxide be classified as a Schedule II pest control product because of how environmentally benign it is. This can be justified [REDACTED] (Schedule II pest control products do not require permits and without pesticide use permits there can be some confidence that purchasing barges and equipment will not have risk of not being able to use the equipment.)

To remind them of the seriousness of the situation:

- It has come to my attention that fish originating at Steamer Point were transferred to Noo-la in April, that Noo-la abundance reached threshold 25 January, 2017 and that Grieg Seafood will be performing SLICE bioassays on the sea lice from Noo-la imminently. We would be interested in the results of that bioassay, and feel that veterinarians from the three companies meet to discuss the results.

Dr. Ian Keith DVM
Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Fisheries Management
Aquaculture Management Division | Gestion de l'aquaculture
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Ian.Keith@dfo-mpo.gc.ca

From: Keith, Ian
Sent: Friday, January 27, 2017 1:30 PM
To: Paylor, Adrienne
Subject: FW: Esperanza

Please note that I just got off the phone [REDACTED] and told him I would call him at the office after your meeting with Karen so that he could gain a few days on harvest i.e. harvest barge, crews, plant readiness..

Dr. Ian Keith DVM
Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Fisheries Management
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s.14
s.16(2)(c)
s.19(1)
s.21(1)(b)

Mobile | Portable: [REDACTED]
Fax | Télécopieur: 250-703-0921
Ian.Keith@dfo-mpo.gc.ca

From: Keith, Ian
Sent: Friday, January 27, 2017 1:28 PM
To: Paylor, Adrienne
Subject: Esperanza

As per our conversation this morning

Dr. Ian Keith DVM
Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
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Aquaculture Management Division | Gestion de l'aquaculture
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s.16(2)(c)

TAB 3

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Manchester, Howie

From: Paylor, Adrienne
Sent: July-20-17 3:27 PM
To: Keith, Ian; Waddington, Zac; Manchester, Howie
Subject: RE: DFO Esperanza lice collection

It is my understanding that the province regulates discharge from processing plants so I'm not sure what our C&P would be able to offer here. Is there something in our CoL that allows us to charge someone for Slice resistant lice? I see that moving the lice to other areas is a concern if they are not already being moved there by/on wild fish? Bernie is coordinating the working group looking at how we can strengthen and clarify our COL around sea lice so perhaps we should bring this issue up there for discussion at our next meeting. [REDACTED]

Adrienne

From: Keith, Ian
Sent: Thursday, July 20, 2017 11:19 AM
To: Waddington, Zac; Manchester, Howie
Cc: Paylor, Adrienne
Subject: RE: DFO Esperanza lice collection

I have to focus on finishing Report E but if you are willing to pursue this Zac, we think this is important. The Marine Harvest processing plant in Port Hardy has effluent clarification and disinfection and CFIA knows this but to my understanding CFIA has not set standards for plants for dealing with effluent.

It is protocol and respectful to first talk with Joe, the C&P lead in Campbell River; I haven't done more than meeting Joe but I would call his predecessor and he would assign an officer, once informed of the situation. Mike Ballard would be the one I would want to consult, if okay with Joe. If able to speak with him - he isn't working Finfish at the moment and is on assignment in Prince George - he is the one I have worked with in the past so know that he knows the detail of the HMP and licence conditions. (I haven't worked any cases up with others in C&P.)

Howie suggested checking for viability of lice and egg strings from lice on the fish on the processing line, and with this approach we might be able to sample through Grieg, not requiring C&P. However, [REDACTED] CAHS, sampled from the effluent pipe from a plant and found that the lice were viable, and she hatched eggs and followed these through the napuli stages. The advantage of her approach is that eggs from any point in the process would be captured. The disadvantage is that since Browns Bay plant may already have processed some wild salmon, and the argument could be made that eggs came from other sources. If there were viable lice on the line, and viable lice in the discharge, then all we would have to demonstrate is 48 or 72 hour viability, whatever is the standard used for bioassay viability. It would also be possible to compare sequences for confirmation that lice from fish and lice in the discharge were the same source.

Of course, eggs from the plant are the greater risk, and this is a potential concentrated point source of lice for returning adults. (I assume that Seymour Narrows is too fast for juveniles but I don't know this.) Regardless, the resistant lice should not move from west coast to east coast but demonstrating viability of eggs means hatching and Simon Jones is busy right now. However, Shannon Balfry at the West Vancouver DFO lab is currently hatching lice in her system, so is a potential resource for us. CAHS doesn't have an aquarium like Nanaimo or West Van, so relies on changes of water and airstones, the same as we in Courtenay would do. (Maria has done this sort of thing at Atlantic Vet College, but we would want to farm out the work if possible.)

In the discharge would be lice and or eggs from any source associated with the process, from the ice slurry in the hold of the harvest vessel, or 1 tonne Xactics totes on the flat bed, the washings after from those empty holds, or the washing from the plant floors.

When Grieg changed processing plants without changing this in their licence, their SOPs would change so we can't be sure how the harvest vessel is dealing with the hold water from Esperanza Inlet when transferring the harvested fish

into totes at Muchalat Channel. I have raised the detail that the changing of the processing plant may require amendments to the Grieg licences and therefore the opportunity to make changes in Grieg's licence conditions,

Thanks for this.

Ian

Dr. Ian Keith DVM
Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
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Ian.Keith@dfo-mpo.gc.ca

From: Waddington, Zac
Sent: Thursday, July 20, 2017 7:34 AM
To: Manchester, Howie; Keith, Ian
Subject: RE: DFO Esperanza lice collection

I have no issue with you responding Howie. Have we heard anything about collection at Brown's Bay?

Dr. Zac Waddington DVM, B.Env.Sc (Hons)
Lead Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Fisheries Management
Aquaculture Management Division | Gestion de l'aquaculture
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Zac.Waddington@dfo-mpo.gc.ca

s.16(2)(c)

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s.23

From: Manchester, Howie
Sent: July-19-17 5:43 PM
To: Waddington, Zac; Keith, Ian
Subject: FW: DFO Esperanza lice collection

Would either of you like to respond, let me know, I have not problem responding to this email if your ok with me doing so.

Howie

From: [REDACTED]
Sent: Wednesday, July 19, 2017 4:46 PM
To: Manchester, Howie

TAB 4

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Waddington, Zac

From: Waddington, Zac
Sent: May-14-18 3:57 PM
To: Rainer, Michelle; Doucette, Claire
Subject: RE: For approval: media lines

Sorry for the delayed response, I was in a conference call for way too long. But I think they look good, and will defer to Claire about the enforcement.

Zac

From: Rainer, Michelle
Sent: May-14-18 2:36 PM
To: Doucette, Claire
Cc: Waddington, Zac
Subject: Re: For approval: media lines

OK I understand now. Will do, thanks

Sent from my BlackBerry 10 smartphone on the Rogers network.

From: Doucette, Claire
Sent: Monday, May 14, 2018 2:32 PM
To: Rainer, Michelle
Subject: RE: For approval: media lines

Michelle, I am just concerned that if it is a really bad outbreak, the reporter is going to ask well will you charge them, why just a letter? We can't and that will take us down another rabbit hole. By stating the following,

.....however, if there has been noncompliance with the license conditions, DFO will address the matter with an appropriate enforcement response.

I believe this is cleaner.

Claire

From: Rainer, Michelle
Sent: Monday, May 14, 2018 2:26 PM
To: Doucette, Claire <Claire.Doucette@dfo-mpo.gc.ca>
Cc: Waddington, Zac <Zac.Waddington@dfo-mpo.gc.ca>
Subject: Re: For approval: media lines

OK thanks. Ok if I just say we would issue the letter?

Sent from my BlackBerry 10 smartphone on the Rogers network.

From: Doucette, Claire
Sent: Monday, May 14, 2018 1:44 PM
To: Rainer, Michelle
Subject: RE: For approval: media lines

Michelle, my only issue with that response is that it may lead the reporter to ask if we would charge if the issue is bad enough and until the COL's are changed we can never charge. Looks bad for us.

From: Rainer, Michelle
Sent: Monday, May 14, 2018 1:19 PM
To: Doucette, Claire <Claire.Doucette@dfo-mpo.gc.ca>; Carlson, Mike <Mike.Carlson@dfo-mpo.gc.ca>; Waddington, Zac <Zac.Waddington@dfo-mpo.gc.ca>
Cc: Ford, Leanne <Leanne.Ford@dfo-mpo.gc.ca>
Subject: RE: For approval: media lines

Thanks, Claire. I'll just say :

Please note that this is not a formal investigation under the *Fisheries Act* or regulations; however, if there has been non-compliance with licence conditions, DFO will issue a formal letter of non-compliance."

Zac, could I also add something like: "and advise on how compliance can be ensured in future." Or something like that?

From: Doucette, Claire
Sent: May-14-18 1:12 PM
To: Rainer, Michelle; Carlson, Mike
Cc: Ford, Leanne
Subject: RE: For approval: media lines

Sorry Michelle, I was in transit. I am not sure if saying further enforcement actions is prudent because the way the condition of license is written, the only thing we can do is issue a letter. C+P's hands are tied at this point. As long as the company has a plan, that's all we can enforce and they do have a plan. Perhaps put afterDFO, will address the matter with an appropriate enforcement response.

Claire

From: Rainer, Michelle
Sent: Monday, May 14, 2018 12:59 PM
To: Carlson, Mike <Mike.Carlson@dfo-mpo.gc.ca>
Cc: Doucette, Claire <Claire.Doucette@dfo-mpo.gc.ca>; Ford, Leanne <Leanne.Ford@dfo-mpo.gc.ca>
Subject: For approval: media lines

Hi Mike,
I'm not sure if Claire is available today and we are under deadline. Can you please review these media lines?
Thanks,
Michelle

Issue: [REDACTED] CBC [REDACTED] is doing a follow-up story on the elevated sea lice levels at Cermaq farms in Clayoquot. Cermaq Canada is voluntarily withdrawing its ASC certification on its fish until the sea lice is under control.

Deadline: May 14, 4 p.m. PST

Recommendation: email lines

Approved by: Zac Waddington

Media lines:

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- Fisheries and Oceans Canada (DFO) is reviewing Cermaq Canada's sea lice management practices at these farms to determine if relevant licence conditions have been followed appropriately.
- Our fish health veterinarians have requested documentation to determine the appropriateness of treatments undertaken at farms, and to ensure that all other treatment and harvest options were duly considered by Cermaq. Financial considerations would not be recognized as justification for exclusion of otherwise effective lice management options.
- Please note that this is not a formal investigation under the *Fisheries Act* or regulations; however, if there has been non-compliance with licence conditions, DFO will issue a formal letter of non-compliance and consider further enforcement options.

From: Waddington, Zac
Sent: May-14-18 12:50 PM
To: Rainer, Michelle; Doucette, Claire
Subject: RE: Cermaq sea lice media request

My thoughts. I did edit bullet two a bit as well.

- Fisheries and Oceans Canada (DFO) is reviewing Cermaq Canada's sea lice management practices at these farms to determine if relevant licence conditions have been followed appropriately.
- Our fish health veterinarians have requested documentation to determine the appropriateness of treatments undertaken at farms, and to ensure that all other treatment and harvest options were duly considered by Cermaq. Financial considerations would not be recognized as justification for exclusion of otherwise effective lice management options.
- Please note that this is not a formal investigation under the *Fisheries Act* or regulations; however, based the results of DFO's review, the company may be required to ?????My thoughts would be that "if non-compliance with licence conditions is found to have occurred, then a formal letter of non-compliance will be issued and [REDACTED] will be considered."

Zac

s.19(1)

s.21(1)(b)

From: Rainer, Michelle
Sent: May-14-18 11:56 AM
To: Waddington, Zac; Doucette, Claire
Subject: Cermaq sea lice media request
Importance: High

Hi Zac,
How is this? Can you fill in the blank at the end outlining any measures/changes that may be required of Cermaq?

Claire, can you please review the wording explaining it's not a formal investigation? This reporter previously receive the version that implied it was.

Thanks,
Michelle

Issue: [REDACTED] CBC ([REDACTED]) is doing a follow-up story on the elevated sea lice levels at Cermaq farms in Clayoquot. Cermaq Canada is voluntarily withdrawing its ASC certification on its fish until the sea lice is under control.

Deadline: May 14, 4 p.m. PST

Recommendation: email lines

Approved by:

Media lines:

- Fisheries and Oceans Canada (DFO) is reviewing Cermaq Canada's sea lice management practices at these farms to determine if relevant licence conditions have been followed appropriately.
- Our fish health veterinarians have requested records documenting the treatment options Cermaq used or considered and to assess whether therapeutants were used appropriately. Financial considerations would not be recognized as justification for exclusion of otherwise effective lice management options.
- Please note that this is not a formal investigation under the *Fisheries Act* or regulations; however, based on the results of DFO's review, the company may be required to ?????

TAB 5

No information has been removed or severed from this page

Waddington, Zac

From: Waddington, Zac
Sent: May-18-18 9:30 AM
To: Jensen, Neil; Doucette, Claire
Cc: Walde, Kirsty; Knight, Joe; Manore, Chris; Paylor, Adrienne
Subject: RE: Clayoquot sea lice graphs

Thanks very much for looking into this. I was not yet working for DFO in the spring of 2017 with the Esperanza lice issue, but from my understanding, this situation is different, [REDACTED]

[REDACTED] We have graphed the absolute sea lice inventory on farms over threshold, and found that the management plan submitted by Cermaq (harvesting), did not meet the criteria of reducing absolute sea lice inventory in the month of March, and graphs for the month of April are pending. I shared the graphs with Claire and can redistribute if necessary (or you can also just speak to Krista S. directly).

All that said, I recognize and agree that our COL are very weak in many areas, and would support opening the licence to change and strengthen our conditions to make them enforceable. In the interim, I was just hoping that this situation in Clayoquot could be reviewed [REDACTED] Unlike the previous situation in Esperanza, here we have documentation demonstrating the failure of their plan to reduce absolute sea lice inventory as per a condition of licence.

Zac

From: Jensen, Neil
Sent: May-17-18 9:05 AM
To: Doucette, Claire; Waddington, Zac
Cc: Walde, Kirsty; Knight, Joe; Manore, Chris
Subject: RE: Clayoquot sea lice graphs

Hi Claire and Zac,

C&P staff looked at this COL in the past and recommended a change as it was not viewed as enforceable. As I understand it, despite the recommendation, no changes were made to the COL and the current wording became fixed for the duration of the licence. A major limitation of the multi-year licences is that COLs may not be amended except for "the purposes of the conservation and protection of fish" (Fishery (General) Regulations, sec. 22(2)). This issue came up last year with an issue of large numbers of sea lice at Grieg on the West coast of Vancouver Island and C&P was asked investigate. However, the only thing that the company can be compelled or held legally accountable for is "implementing a plan" – whatever that means. There is no measure or quantifiable action that we can determine happened or not (i.e. within a prescribed time period). As long as the company has a plan and implements it, they are in compliance of the COL. For example, if they discovered the sea lice and ordered up hydrogen peroxide treatments and a well boat, but it will take 6 months to get in place in order to reduce the number of sea lice, they would be compliant. [REDACTED]

The only avenue that I can recommend is that you try to convince Allison [REDACTED] that the COL needs to be changed for conservation and protection reasons (for wild fish). They may have considered this last year, but I wasn't involved in

s.21(1)(b)

s.23

any of those discussions if they did occur. If there is agreement that the COL can be amended, C&P staff would be happy to help you develop an enforceable COL.

Neil Jensen

Fishery Officer / Agent des pêches

Senior Compliance Officer / Conservation and Protection / Aquaculture
Fisheries and Oceans Canada / Gouvernement du Canada
Neil.Jensen@dfo-mpo.gc.ca / Tél : 250-754-0386
2 – 1965 Island Diesel Way, Nanaimo, BC V9S 5W8

Agent principal d'application de la réglementation / Conservation et Protection / Aquaculture
Pêches et Océans Canada / Gouvernement du Canada
Neil.Jensen@dfo-mpo.gc.ca / Tél : 250-754-0386
2 – 1965, chemin Island Diesel, Nanaimo, CB V9S 5W8

From: Doucette, Claire
Sent: May-17-18 7:30 AM
To: Waddington, Zac
Cc: Jensen, Neil; Walde, Kirsty
Subject: FW: Clayoquot sea lice graphs

Zac, I am sorry, I was in meetings for most of yesterday and didn't have a chance to read through this however, as discussed Neil Jensen is well aware of the COL and the issues surrounding sea lice. Neil, Zac is seeking clarification on the issue surrounding our capacity to charge. [REDACTED] Zac has provided below his information. I appreciate shellfish is your bailiwick but you know a lot on the matter. Kirsty, feel free to feed in.

Thank you
Claire

From: Waddington, Zac
Sent: Wednesday, May 16, 2018 9:43 PM
To: Doucette, Claire <Claire.Doucette@dfo-mpo.gc.ca>
Subject: RE: Clayoquot sea lice graphs

Sorry to bug you again, but I'm curious if you've had a chance to review this and what your thoughts were regarding it?

Zac

From: Waddington, Zac
Sent: May-14-18 4:15 PM
To: Doucette, Claire
Subject: FW: Clayoquot sea lice graphs

Please see the hyperlink below which has numerous graphs based on industry reported sea lice data. Please focus on the "Total Lice Abundance" tab which demonstrates the absolute sea lice inventory on the various farms. This is calculated by multiplying the mid-month inventory on farm, by an average of the month's sea lice counts; therefore we only get one data point per month. Industry reports their monthly inventory and sea lice numbers for each month, on the month following by the 15th. Therefore, our current graphs only have data up until the end of March, but by tomorrow we could update these graphs until the end of April. Based on the lice numbers I've seen, there is no expectation that things have improved, with the exception of Millar Channel which has been harvested out.

s.21(1)(b)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Tuesday, May 14, 2019 11:50 AM
To: Paylor, Adrienne
Subject: 2019Q1 Sea Lice audit report for your review

Hi Adrienne,

The 2019 Q1 Sea Lice Audit report is ready for your review. Please review the red tab.

\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\3. Audit Table - Quarterly\Sea Lice Audit 2011-ongoing for WEB.xlsx

Cheers,
Krista.

Krista Sandberg

Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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of Canada

Gouvernement
du Canada

Canada

s.16(2)(c)

| Audit Date | Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Industry average L. salmonis motiles per fish | DFO average L. salmonis motiles per fish | Comments | Year Class |
|------------|---------------------------|-----------------------|--------------------|----------|------------|------------------|---|--|---|------------|
| 15-Apr-11 | 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 19-Apr-11 | 543 | Mainstream Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 0.2 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 28-Apr-11 | 137 | Marine Harvest Canada | Conville Bay | 50.18057 | -125.14933 | 3.2 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 2-May-11 | 378 | Marine Harvest Canada | Thurlow | 50.40808 | -125.34088 | 3.2 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 25-May-11 | 306 | Mainstream Canada | Venture Point | 50.30241 | -125.33778 | 3.2 | 0.5 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 26-May-11 | 1863 | Grieg Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | 0.3 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 1-Jun-11 | 520 | Mainstream Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | 0.7 | 1.1 | Statistical agreement between DFO and Industry counts | 1 |
| 2-Jun-11 | 1376 | Marine Harvest Canada | Cleagh Creek | 50.48224 | -127.73243 | 2.4 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 3-Jun-11 | 1472 | Mainstream Canada | West Side | 49.27928 | -125.83065 | 2.3 | 0.4 | 0.7 | Statistical agreement between DFO and Industry counts | 1 |
| 6-Jun-11 | 1336 | Mainstream Canada | Simmonds Point | 50.87791 | -126.90153 | 3.4 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 7-Jun-11 | 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 0.0 | 0.0 | Statistical comparison not possible | 2 |
| 8-Jun-11 | 1144 | Mainstream Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 9-Jun-11 | 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 0.9 | 0.7 | Statistical agreement between DFO and Industry counts | 2 |
| 21-Jun-11 | 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 22-Jun-11 | 1580 | Marine Harvest Canada | Jackson Pass | 52.53727 | -128.40286 | 3.5 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 12-Jul-11 | 526 | Mainstream Canada | Rant Point | 49.25670 | -125.84153 | 2.3 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 22-Jul-11 | 1789 | Grieg Seafood BC | Concepcion | 49.65923 | -126.47587 | 2.4 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 4-Aug-11 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 3.5 | 3.7 | Statistical agreement between DFO and Industry counts | 1 |
| 17-Aug-11 | 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | 0.5 | 0.7 | Statistical agreement between DFO and Industry counts | 1 |
| 8-Sep-11 | 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 14-Sep-11 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.2 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 19-Sep-11 | 1401 | Mainstream Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 0.4 | 0.7 | Statistical agreement between DFO and Industry counts | 1 |
| 5-Oct-11 | 821 | Marine Harvest Canada | Glacier Falls | 50.84785 | -126.31921 | 3.3 | 1.5 | 1.3 | Statistical agreement between DFO and Industry counts | 1 |
| 6-Oct-11 | 465 | Marine Harvest Canada | Swanson | 50.61871 | -126.70473 | 3.3 | 1.5 | 2.0 | Statistical agreement between DFO and Industry counts | 2 |
| 12-Oct-11 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 3.0 | 3.3 | Statistical agreement between DFO and Industry counts | 1 |
| 12-Oct-11 | 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 1.8 | 2.4 | Statistical agreement between DFO and Industry counts | 2 |
| 13-Oct-11 | 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 2.3 | 2.4 | Statistical agreement between DFO and Industry counts | 1 |
| 14-Oct-11 | 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | 3.4 | 3.0 | Statistical agreement between DFO and Industry counts | 1 |
| 18-Oct-11 | 790 | Marine Harvest Canada | Chancellor Channel | 50.41723 | -125.66284 | 3.2 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 19-Oct-11 | 378 | Marine Harvest Canada | Thurlow | 50.40808 | -125.34088 | 3.2 | 0.3 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 2-Nov-11 | 1896 | Marine Harvest Canada | Lime Point | 52.78538 | -128.33133 | 3.5 | 2.2 | 2.5 | Statistical agreement between DFO and Industry counts | 1 |
| 7-Nov-11 | 1472 | Mainstream Canada | West Side | 49.27928 | -125.83065 | 2.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 8-Nov-11 | 1537 | Mainstream Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 18-Nov-11 | 1698 | Grieg Seafood BC | Ahlistrom | 49.77930 | -124.15395 | 3.1 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 29-Nov-11 | 1789 | Grieg Seafood BC | Concepcion | 49.65923 | -126.47587 | 2.4 | 1.4 | 0.9 | Statistical agreement between DFO and Industry counts | 1 |
| 11-Jan-12 | 378 | Marine Harvest Canada | Thurlow | 50.40808 | -125.34088 | 3.2 | 0.2 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 17-Jan-12 | 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 0.9 | 0.9 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Jan-12 | 543 | Mainstream Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 0.2 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Jan-12 | 227 | Mainstream Canada | Bawden | 49.30798 | -126.00721 | 2.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 31-Jan-12 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 8.6 | 8.5 | Statistical agreement between DFO and Industry counts | 2 |
| 7-Feb-12 | 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 1.5 | 1.2 | Statistical agreement between DFO and Industry counts | 2 |
| 12-Feb-12 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 0.0 | 0.0 | Statistical comparison not possible | 2 |

| | | | | | | | | | | |
|-----------|------|-----------------------|-----------------|----------|------------|-----|------|------|---|---|
| 14-Feb-12 | 1738 | Grieg Seafood BC | Atrevida | 49.65603 | -126.45404 | 2.4 | 0.4 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Feb-12 | 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | 0.1 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 23-Feb-12 | 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 0.3 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 8-Mar-12 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 9-Mar-12 | 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.41990 | 3.5 | 0.5 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 3-Apr-12 | 211 | Marine Harvest Canada | Okisollo | 50.30946 | -125.31618 | 3.2 | 2.5 | 4.7 | Statistical agreement between DFO and Industry counts | 2 |
| 11-Apr-12 | 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | 0.6 | 1.2 | Statistical agreement between DFO and Industry counts | 2 |
| 11-Apr-12 | 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | 0.5 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 13-Apr-12 | 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 16-Apr-12 | 540 | Mainstream Canada | Fortune Channel | 49.23503 | -125.75174 | 2.3 | 0.5 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |
| 17-Apr-12 | 1507 | Mainstream Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 18-Apr-12 | 1537 | Mainstream Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 18-Apr-12 | 520 | Mainstream Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | 1.2 | 1.6 | Statistical agreement between DFO and Industry counts | 2 |
| 30-Apr-12 | 1738 | Grieg Seafood BC | Atrevida | 49.65603 | -126.45404 | 2.4 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 30-Apr-12 | 1700 | Grieg Seafood BC | Muchalat South | 49.64012 | -126.32735 | 2.4 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 1-May-12 | 1705 | Grieg Seafood BC | Williamson | 49.65623 | -126.42849 | 2.4 | 0.2 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 7-May-12 | 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 14-May-12 | 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 15-May-12 | 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 23-May-12 | 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 0.9 | 0.8 | Statistical agreement between DFO and Industry counts | 2 |
| 23-May-12 | 739 | Mainstream Canada | Upper Retreat | 50.72183 | -126.56810 | 3.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 24-May-12 | 1144 | Mainstream Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 24-May-12 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 2.5 | 1.8 | Statistical agreement between DFO and Industry counts | 2 |
| 5-Jun-12 | 733 | Marine Harvest Canada | Cyrus Rock | 50.25682 | -125.21030 | 3.2 | 1.5 | 1.0 | Statistical agreement between DFO and Industry counts | 2 |
| 17-Jul-12 | 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 27-Jul-12 | 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.47587 | 2.4 | 0.3 | 0.2 | Statistical agreement between DFO and Industry counts; Audit included only one pen. | 2 |
| 5-Sep-12 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 10.2 | 13.4 | Statistical agreement between DFO and Industry counts | 2 |
| 18-Sep-12 | 1291 | Cermaq Canada | McIntyre Lake | 49.30557 | -125.81583 | 2.3 | 0.5 | 0.6 | Statistical agreement between DFO and Industry counts | 1 |
| 17-Oct-12 | 733 | Marine Harvest Canada | Cyrus Rock | 50.25682 | -125.21030 | 3.2 | 3.8 | 3.2 | Statistical agreement between DFO and Industry counts | 2 |
| 23-Oct-12 | 1700 | Grieg Seafood BC | Muchalat South | 49.64012 | -126.32735 | 2.4 | 1.9 | 1.9 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Oct-12 | 1580 | Marine Harvest Canada | Jackson Pass | 52.53727 | -128.40286 | 3.5 | 3.2 | 5.1 | Statistical agreement between DFO and Industry counts | 1 |
| 31-Oct-12 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 4.0 | 5.3 | Statistical agreement between DFO and Industry counts | 1 |
| 8-Nov-12 | 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 0.3 | 0.4 | Statistical agreement between DFO and Industry counts | 1 |
| 4-Dec-12 | 1291 | Cermaq Canada | McIntyre Lake | 49.30557 | -125.81583 | 2.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 30-Jan-13 | 211 | Marine Harvest Canada | Okisollo | 50.30946 | -125.31618 | 3.2 | 2.9 | 2.4 | Statistical agreement between DFO and Industry counts | 2 |
| 13-Feb-13 | 1198 | Marine Harvest Canada | Raynor | 50.89253 | -127.25359 | 3.4 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 14-Feb-13 | 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 1.7 | 1.8 | Statistical agreement between DFO and Industry counts | 2 |
| 18-Feb-13 | 1700 | Grieg Seafood BC | Muchalat South | 49.64012 | -126.32735 | 2.4 | 0.8 | 1.1 | Statistical agreement between DFO and Industry counts | 2 |
| 5-Mar-13 | 234 | Mainstream Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 12-Mar-13 | 884 | Marine Harvest Canada | Lochalsh Bay | 52.53399 | -128.36020 | 3.5 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 10-Apr-13 | 304 | Mainstream Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 0.3 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Apr-13 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 26-Apr-13 | 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 1-May-13 | 1895 | Marine Harvest Canada | Sheep Passage | 52.79609 | -128.31093 | 3.5 | 9.8 | 9.8 | Statistical agreement between DFO and Industry counts | 2 |

| | | | | | | | | | | |
|-----------|------|-----------------------|----------------|----------|------------|-----|------|------|--|---|
| 6-May-13 | 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 2.4 | 3.1 | Statistical agreement between DFO and Industry counts | 2 |
| 7-May-13 | 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 7-May-13 | 728 | Mainstream Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 0.2 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 8-May-13 | 739 | Marine Harvest Canada | Upper Retreat | 50.72183 | -126.56810 | 3.3 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 8-May-13 | 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 0.1 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 9-May-13 | 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 16-May-13 | 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 21-May-13 | 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 22-May-13 | 884 | Marine Harvest Canada | Lochalsh Bay | 52.53399 | -128.36020 | 3.5 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 22-May-13 | 1895 | Marine Harvest Canada | Sheep Passage | 52.79609 | -128.31093 | 3.5 | 8.0 | 7.6 | Statistical agreement between DFO and Industry counts | 2 |
| 23-May-13 | 1338 | Marine Harvest Canada | Mahatta East | 50.47460 | -127.78758 | 2.4 | 2.5 | 2.5 | Statistical agreement between DFO and Industry counts | 2 |
| 23-May-13 | 1238 | Marine Harvest Canada | Mahatta West | 50.46900 | -127.83538 | 2.4 | 2.5 | 1.8 | Statistical agreement between DFO and Industry counts | 2 |
| 4-Jun-13 | 234 | Mainstream Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 4-Jun-13 | 314 | Mainstream Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 5-Jun-13 | 526 | Mainstream Canada | Rant Point | 49.25670 | -125.84153 | 2.3 | 1.5 | 1.3 | Statistical agreement between DFO and Industry counts | 2 |
| 7-Jun-13 | 543 | Mainstream Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 1.5 | 1.5 | Statistical agreement between DFO and Industry counts | 1 |
| 11-Jul-13 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -127.52057 | 3.2 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Jul-13 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 1.2 | 0.8 | Statistical agreement between DFO and Industry counts | 1 |
| 31-Jul-13 | 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 2.7 | 2.6 | Statistical agreement between DFO and Industry counts | 1 |
| 27-Aug-13 | 1580 | Marine Harvest Canada | Jackson Pass | 52.53727 | -128.40286 | 3.5 | 1.6 | 0.9 | Statistical agreement between DFO and Industry counts | 1 |
| 10-Sep-13 | 1507 | Mainstream Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 0.8 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |
| 20-Sep-13 | 821 | Marine Harvest Canada | Glacier Falls | 50.84785 | -126.31921 | 3.3 | 1.6 | 2.2 | Statistical agreement between DFO and Industry counts | 1 |
| 24-Oct-13 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 28-Oct-13 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 10.4 | 11.7 | Statistical agreement between DFO and Industry counts | 2 |
| 14-Nov-13 | 1789 | Grieg Seafood BC | Concepcion | 49.65923 | -126.47587 | 2.4 | 0.7 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |
| 20-Nov-13 | 728 | Mainstream Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 21-Nov-13 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 5.7 | 10.7 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 6-Dec-13 | 227 | Mainstream Canada | Bawden | 49.30798 | -126.00721 | 2.3 | 0.5 | 0.9 | Statistical agreement between DFO and Industry counts | 1 |
| 5-Feb-14 | 143 | Marine Harvest Canada | Larsen Island | 50.60175 | -126.63284 | 3.3 | 0.1 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 6-Feb-14 | 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 13-Feb-14 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 4-Mar-14 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 0.3 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 11-Mar-14 | 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 0.2 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 8-Apr-14 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 0.0 | 0.5 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 10-Apr-14 | 1789 | Grieg Seafood BC | Concepcion | 49.65923 | -126.47587 | 2.4 | 0.2 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 28-Apr-14 | 739 | Marine Harvest Canada | Upper Retreat | 50.72183 | -126.56810 | 3.3 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Apr-14 | 1144 | Cermaq Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Apr-14 | 728 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 0.3 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 1-May-14 | 1825 | Grieg Seafood BC | Noo-la | 50.60799 | -126.36301 | 3.3 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 2-May-14 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 13-May-14 | 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |

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|-----------|------|-----------------------|----------------|----------|------------|-----|------|------|--|---|
| 13-May-14 | 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.50040 | 3.4 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 14-May-14 | 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.41990 | 3.5 | 0.4 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 15-May-14 | 1580 | Marine Harvest Canada | Jackson Pass | 52.53727 | -128.40286 | 3.5 | 0.0 | 0.0 | Statistical comparison not possible | 1 |
| 15-May-14 | 1238 | Marine Harvest Canada | Mahatta West | 50.46900 | -127.83538 | 2.4 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 16-May-14 | 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 0.9 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 16-May-14 | 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 0.2 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 3-Jun-14 | 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 0.1 | 0.3 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 3-Jun-14 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 1.7 | 1.3 | Statistical agreement between DFO and Industry counts | 2 |
| 3-Jun-14 | 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | 0.6 | 1.1 | Statistical agreement between DFO and Industry counts | 1 |
| 4-Jun-14 | 1291 | Cermaq Canada | McIntyre Lake | 49.30557 | -125.81583 | 2.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 12-Jun-14 | 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 4.6 | 5.0 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Jun-14 | 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 17-Jul-14 | 1863 | Grieg Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | 1.0 | 1.0 | Statistical agreement between DFO and Industry counts | 1 |
| 14-Aug-14 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 1.6 | 2.1 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Aug-14 | 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 4.3 | 5.5 | Statistical agreement between DFO and Industry counts | 2 |
| 27-Aug-14 | 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.41990 | 3.5 | 1.8 | 1.6 | Statistical agreement between DFO and Industry counts | 2 |
| 2-Sep-14 | 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 0.0 | 0.0 | Statistical comparison not possible | 2 |
| 16-Sep-14 | 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 9-Oct-14 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 0.6 | 0.7 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Oct-14 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 12-Nov-14 | 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.41990 | 3.5 | 13.2 | 16.4 | Statistical agreement between DFO and Industry counts | 2 |
| 12-Nov-14 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 8.0 | 11.4 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 27-Jan-15 | 1472 | Cermaq Canada | West Side | 49.27928 | -125.83065 | 2.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 10-Feb-15 | 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 2.9 | 5.4 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 26-Feb-15 | 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 8.0 | 9.4 | Statistical agreement between DFO and Industry counts | 2 |
| 9-Mar-15 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.0 | 0.1 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 11-Mar-15 | 1896 | Marine Harvest Canada | Lime Point | 52.78538 | -128.33133 | 3.5 | 15.6 | 13.7 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 18-Mar-15 | 1700 | Grieg Seafood BC | Muchalat South | 49.64012 | -126.32735 | 2.4 | 1.5 | 1.0 | Statistical agreement between DFO and Industry counts | 2 |
| 20-Apr-15 | 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 1.3 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |

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|-----------|------|-----------------------|-----------------|----------|------------|-----|------|------|--|---|
| 22-Apr-15 | 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 19.9 | 24.9 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 22-Apr-15 | 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 0.0 | 0.0 | Statistical comparison not possible | 1 |
| 23-Apr-15 | 1336 | Cermaq Canada | Simmonds Point | 50.87791 | -126.90153 | 3.4 | 3.4 | 2.2 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 23-Apr-15 | 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 0.4 | 1.9 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 1 |
| 28-Apr-15 | 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 0.3 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 28-Apr-15 | 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 1.1 | 0.5 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 29-Apr-15 | 1144 | Cermaq Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 5.9 | 7.2 | Statistical agreement between DFO and Industry counts | 2 |
| 30-Apr-15 | 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | 0.5 | 0.6 | Statistical agreement between DFO and Industry counts | 2 |
| 30-Apr-15 | 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 1.7 | 1.7 | Statistical agreement between DFO and Industry counts | 2 |
| 12-May-15 | 1338 | Marine Harvest Canada | Mahatta East | 50.47460 | -127.78758 | 2.4 | 9.2 | 12.5 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 12-May-15 | 1238 | Marine Harvest Canada | Mahatta West | 50.46900 | -127.83538 | 2.4 | 8.6 | 9.1 | Statistical agreement between DFO and Industry counts | 2 |
| 12-May-15 | 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 4.0 | 4.9 | Statistical agreement between DFO and Industry counts | 1 |
| 13-May-15 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 13-May-15 | 1895 | Marine Harvest Canada | Sheep Passage | 52.79609 | -128.31093 | 3.5 | 16.3 | 25.7 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 25-May-15 | 540 | Cermaq Canada | Fortune Channel | 49.23503 | -125.75174 | 2.3 | 5.0 | 4.9 | Statistical agreement between DFO and Industry counts | 2 |
| 25-May-15 | 526 | Cermaq Canada | Rant Point | 49.25670 | -125.84153 | 2.3 | 0.1 | 0.4 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 26-May-15 | 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 0.6 | 0.9 | Statistical agreement between DFO and Industry counts | 1 |
| 26-May-15 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 1.0 | 1.0 | Statistical agreement between DFO and Industry counts | 1 |
| 27-May-15 | 1291 | Cermaq Canada | McIntyre Lake | 49.30557 | -125.81583 | 2.3 | 2.5 | 2.8 | Statistical agreement between DFO and Industry counts | 2 |
| 29-May-15 | 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 4.7 | 5.9 | Statistical agreement between DFO and Industry counts | 1 |
| 8-Jun-15 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 1.5 | 3.1 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 9-Jun-15 | 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.47587 | 2.4 | 0.9 | 1.0 | Statistical agreement between DFO and Industry counts | 1 |
| 15-Jun-15 | 1300 | Marine Harvest Canada | Althorpe | 50.47531 | -125.80975 | 3.2 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 15-Jun-15 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Jun-15 | 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 4.7 | 4.3 | Statistical agreement between DFO and Industry counts | 1 |
| 18-Jun-15 | 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 19-Jun-15 | 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 19-Jun-15 | 1586 | Marine Harvest Canada | Doctor Islets | 50.65373 | -126.28925 | 3.3 | 0.2 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Jul-15 | 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Aug-15 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 10.5 | 11.7 | Statistical agreement between DFO and Industry counts | 2 |
| 2-Sep-15 | 527 | Cermaq Canada | Saranak Island | 49.24803 | -125.90671 | 2.3 | 7.6 | 9.2 | Statistical agreement between DFO and Industry counts | 2 |

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|-----------|------|-----------------------|----------------|----------|------------|-----|-----|-----|--|---|
| 14-Sep-15 | 1738 | Grieg Seafood BC | Atrevida | 49.65603 | -126.45404 | 2.4 | 4.5 | 5.0 | Statistical agreement between DFO and Industry counts | 2 |
| 7-Oct-15 | 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 1.0 | 1.0 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Oct-15 | 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 7.5 | 6.9 | Statistical agreement between DFO and Industry counts | 1 |
| 21-Oct-15 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 2.2 | 1.5 | Statistical agreement between DFO and Industry counts | 2 |
| 27-Oct-15 | 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 4-Nov-15 | 221 | Grieg Seafood BC | Vantage | 49.67226 | -123.86019 | 3.1 | 0.7 | 1.6 | Statistical agreement between DFO and Industry counts | 2 |
| 20-Nov-15 | 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | 0.4 | 0.6 | Statistical agreement between DFO and Industry counts | 2 |
| 2-Dec-15 | 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 0.0 | 0.3 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 13-Jan-16 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 0.2 | 1.3 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 20-Jan-16 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 2-Feb-16 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 2.7 | 3.7 | Statistical agreement between DFO and Industry counts | 1 |
| 9-Feb-16 | 1702 | Marine Harvest Canada | Goat Cove | 52.78726 | -128.41990 | 3.5 | 0.6 | 0.5 | Statistical agreement between DFO and Industry counts | 2 |
| 10-Feb-16 | 1237 | Marine Harvest Canada | Monday Rocks | 50.48588 | -127.87584 | 2.4 | 2.7 | 2.9 | Statistical agreement between DFO and Industry counts | 2 |
| 22-Feb-16 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 0.1 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Mar-16 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 0.7 | 0.7 | Statistical agreement between DFO and Industry counts | 2 |
| 13-Apr-16 | 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 1.7 | 1.5 | Statistical agreement between DFO and Industry counts | 2 |
| 14-Apr-16 | 306 | Cermaq Canada | Venture Point | 50.30241 | -125.33778 | 3.2 | 0.7 | 1.3 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 15-Apr-16 | 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 20-Apr-16 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 0.5 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Apr-16 | 141 | Marine Harvest Canada | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 26-Apr-16 | 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 0.9 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Apr-16 | 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 27-Apr-16 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 28-Apr-16 | 1144 | Cermaq Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 0.8 | 1.4 | Statistical agreement between DFO and Industry counts | 1 |
| 29-Apr-16 | 728 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 9-May-16 | 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 10-May-16 | 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.50040 | 3.4 | 0.3 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 11-May-16 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 2.0 | 1.5 | Statistical agreement between DFO and Industry counts | 1 |
| 13-May-16 | 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 3.8 | 2.8 | Statistical agreement between DFO and Industry counts | 2 |
| 24-May-16 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 2.0 | 2.5 | Statistical agreement between DFO and Industry counts | 2 |
| 25-May-16 | 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 1.6 | 2.7 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 1-Jun-16 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 0.3 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |

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|-----------|------|-----------------------|-----------------|----------|------------|-----|------|------|--|---|
| 2-Jun-16 | 1863 | Grieg Seafood BC | Esperanza | 49.87814 | -126.76145 | 2.4 | 0.1 | 0.3 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 13-Jun-16 | 1148 | Cermaq Canada | Binns Island | 49.34182 | -125.95328 | 2.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 14-Jun-16 | 540 | Cermaq Canada | Fortune Channel | 49.23503 | -125.75174 | 2.3 | 1.1 | 1.8 | Statistical agreement between DFO and Industry counts | 1 |
| 15-Jun-16 | 1472 | Cermaq Canada | West Side | 49.27928 | -125.83065 | 2.3 | 0.6 | 1.0 | Statistical agreement between DFO and Industry counts | 1 |
| 17-Jun-16 | 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | 1.7 | 4.7 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 1 |
| 21-Jun-16 | 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 0.5 | 0.7 | Statistical agreement between DFO and Industry counts | 1 |
| 13-Jul-16 | 1059 | Marine Harvest Canada | Sargeaunt Pass | 50.67346 | -126.18595 | 3.3 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 14-Jul-16 | 7053 | Marine Harvest Canada | Ghi Ya | 50.90078 | -127.93638 | 3.4 | 5.3 | 5.3 | Statistical agreement between DFO and Industry counts | 2 |
| 20-Jul-16 | 1895 | Marine Harvest Canada | Sheep Passage | 52.79609 | -128.31093 | 3.5 | 0.5 | 0.9 | Statistical agreement between DFO and Industry counts | 1 |
| 22-Aug-16 | 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 31-Aug-16 | 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 0.2 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 12-Oct-16 | 1895 | Marine Harvest Canada | Sheep Passage | 52.79609 | -128.31093 | 3.5 | 12.8 | 12.7 | Statistical agreement between DFO and Industry counts; Audit included only two pens. | 2 |
| 20-Oct-16 | 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.50040 | 3.4 | 1.2 | 1.4 | Statistical agreement between DFO and Industry counts | 1 |
| 10-Nov-16 | 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 3.1 | 3.2 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Nov-16 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.8 | 0.9 | Statistical agreement between DFO and Industry counts | 2 |
| 6-Dec-16 | 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 14-Dec-16 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 12.6 | 14.8 | Statistical agreement between DFO and Industry counts | 2 |
| 11-Jan-17 | 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 11.3 | 11.2 | Statistical agreement between DFO and Industry counts | 2 |
| 23-Jan-17 | 1293 | Marine Harvest Canada | Duncan Island | 50.81950 | -127.55568 | 3.4 | 3.0 | 3.7 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Jan-17 | 1895 | Marine Harvest Canada | Sheep Passage | 52.79609 | -128.31093 | 3.5 | 6.1 | 5.7 | Statistical agreement between DFO and Industry counts | 2 |
| 1-Feb-17 | 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 22-Feb-17 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 36.3 | 44.3 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 28-Feb-17 | 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 0.2 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |
| 7-Mar-17 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 1.7 | 2.8 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 10-Apr-17 | 820 | Marine Harvest Canada | Wicklow Point | 50.78659 | -126.69153 | 3.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 11-Apr-17 | 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.50040 | 3.4 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 12-Apr-17 | 1293 | Marine Harvest Canada | Duncan Island | 50.81950 | -127.55568 | 3.4 | 0.4 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 18-Apr-17 | 141 | Marine Harvest Canada | Port Elizabeth | 50.67099 | -126.47653 | 3.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts; Audit included only two pens. | 1 |
| 19-Apr-17 | 1059 | Marine Harvest Canada | Sargeaunt Pass | 50.67346 | -126.18595 | 3.3 | 0.2 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 20-Apr-17 | 869 | Cermaq Canada | Maude Island | 50.85271 | -126.75743 | 3.3 | 0.0 | 0.0 | Statistical comparison not possible | 2 |
| 21-Apr-17 | 1825 | Grieg Seafood BC | Noo-ia | 50.60799 | -126.36301 | 3.3 | 0.2 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Apr-17 | 1144 | Cermaq Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 0.1 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Apr-17 | 728 | Cermaq Canada | Sir Edmund Bay | 50.83096 | -126.59684 | 3.3 | 0.2 | 0.5 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Apr-17 | 892 | Marine Harvest Canada | Bell Island | 50.83242 | -127.52057 | 3.4 | 0.3 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 9-May-17 | 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33953 | 2.4 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts; Audit included only two pens | 1 |
| 10-May-17 | 1789 | Grieg Seafood BC | Concepcion | 49.65923 | -126.47587 | 2.4 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |

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|-----------|------|-----------------------|-----------------|----------|------------|-----|------|------|--|---|
| 11-May-17 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 13.2 | 13.1 | Statistical agreement between DFO and Industry counts | 2 |
| 17-May-17 | 78 | Marine Harvest Canada | Phillips Arm | 50.48825 | -125.35658 | 3.2 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 29-May-17 | 227 | Cermaq Canada | Bawden | 49.30798 | -126.00721 | 2.3 | 0.7 | 1.9 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 1 |
| 30-May-17 | 234 | Cermaq Canada | Dixon Bay | 49.40478 | -126.15072 | 2.3 | 1.4 | 2.1 | Statistical agreement between DFO and Industry counts | 1 |
| 30-May-17 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 2.6 | 4.1 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 1 |
| 31-May-17 | 540 | Cermaq Canada | Fortune Channel | 49.23503 | -125.75174 | 2.3 | 1.0 | 1.2 | Statistical agreement between DFO and Industry counts | 2 |
| 31-May-17 | 1472 | Cermaq Canada | West Side | 49.27928 | -125.83065 | 2.3 | 0.3 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 7-Jun-17 | 1581 | Marine Harvest Canada | Hardwicke | 50.41339 | -125.76974 | 3.2 | 1.1 | 1.3 | Statistical agreement between DFO and Industry counts | 2 |
| 14-Jun-17 | 7714 | Marine Harvest Canada | Alexander | 52.67648 | -128.57494 | 3.5 | 0.5 | 0.7 | Statistical agreement between DFO and Industry counts | 1 |
| 15-Jun-17 | 144 | Marine Harvest Canada | Koskimo | 50.45861 | -127.88988 | 2.4 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 15-Jun-17 | 1338 | Marine Harvest Canada | Mahatta East | 50.47460 | -127.78758 | 2.4 | 0.4 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 20-Jun-17 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 22-Jun-17 | 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0.4 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 12-Jul-17 | 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.50040 | 3.4 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 14-Jul-17 | 1144 | Cermaq Canada | Burdwood | 50.79690 | -126.49581 | 3.3 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 18-Jul-17 | 1789 | Grieg Seafood BC | Conception | 49.65923 | -126.47587 | 2.4 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 15-Aug-17 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 0.2 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 15-Aug-17 | 7713 | Marine Harvest Canada | Cougar | 52.71993 | -128.57432 | 3.5 | 4.3 | 3.8 | Statistical agreement between DFO and Industry counts | 1 |
| 30-Aug-17 | 227 | Cermaq Canada | Bawden | 49.30798 | -126.00721 | 2.3 | 0.5 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |
| 13-Sep-17 | 211 | Marine Harvest Canada | Okisollo | 50.30946 | -125.31618 | 3.2 | 0.3 | 0.0 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 17-Oct-17 | 1839 | Grieg Seafood BC | Wa-kwa | 50.60106 | -126.34741 | 3.3 | 0.6 | 0.6 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Oct-17 | 7714 | Marine Harvest Canada | Alexander | 52.67648 | -128.57494 | 3.5 | 6.6 | 6.2 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Oct-17 | 7053 | Marine Harvest Canada | Ghi ya | 50.90078 | -127.93638 | 3.4 | 3.0 | 3.3 | Statistical agreement between DFO and Industry counts | 1 |
| 31-Oct-17 | 306 | Cermaq Canada | Venture Point | 50.30241 | -125.33778 | 3.2 | 3.8 | 3.5 | Statistical agreement between DFO and Industry counts | 1 |
| 9-Nov-17 | 1762 | Grieg Seafood BC | Gore | 49.64660 | -126.43167 | 2.4 | 5.1 | 7.7 | Statistically significant difference between DFO and Industry counts; Follow-up actions taken | 2 |
| 16-Nov-17 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 1.0 | 1.1 | Statistical agreement between DFO and Industry counts | 1 |
| 22-Nov-17 | 520 | Cermaq Canada | Bedwell | 49.26548 | -125.81247 | 2.3 | 1.0 | 1.1 | Statistical agreement between DFO and Industry counts | 1 |
| 24-Jan-18 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 0.3 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 24-Jan-18 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 3.1 | 2.5 | Statistical agreement between DFO and Industry counts | 1 |
| 26-Jan-18 | 7053 | Marine Harvest Canada | Ghi ya | 50.90078 | -127.93638 | 3.4 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 7-Feb-18 | 1401 | Cermaq Canada | Brent Island | 50.28613 | -125.34917 | 3.2 | 0.0 | 0.0 | Statistical comparison not possible | 1 |
| 14-Feb-18 | 1762 | Grieg Seafood BC | Gore | 49.64660 | -126.43167 | 2.4 | 2.4 | 2.8 | Statistical agreement between DFO and Industry counts | 2 |
| 28-Feb-18 | 543 | Cermaq Canada | Mussel Rock | 49.25925 | -125.86762 | 2.3 | 1.8 | 1.8 | Statistical agreement between DFO and Industry counts | 2 |
| 28-Feb-18 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 15.5 | 22.1 | Statistical agreement between DFO and Industry counts | 2 |
| 8-Mar-18 | 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 6-Apr-18 | 1825 | Grieg Seafood BC | Noo-la | 50.60799 | -126.36301 | 3.3 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 11-Apr-18 | 1618 | Marine Harvest Canada | Humphrey Rock | 50.69682 | -126.25532 | 3.3 | 0.0 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 11-Apr-18 | 1059 | Marine Harvest Canada | Sargeant Pass | 50.67346 | -126.18595 | 3.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 12-Apr-18 | 143 | Marine Harvest Canada | Larsen Island | 50.60175 | -126.63284 | 3.3 | 0.8 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |

| | | | | | | | | | | |
|-----------|------|-----------------------|-----------------|----------|------------|-----|------|------|--|---|
| 12-Apr-18 | 467 | Marine Harvest Canada | Midsummer | 50.65784 | -126.66298 | 3.3 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 24-Apr-18 | 1351 | Marine Harvest Canada | Marsh Bay | 50.90567 | -127.34239 | 3.4 | 0.0 | 0.0 | Statistical comparison not possible | 2 |
| 25-Apr-18 | 7714 | Marine Harvest Canada | Alexander | 52.67648 | -128.57494 | 3.5 | 1.7 | 1.1 | Statistical agreement between DFO and Industry counts | 2 |
| 25-Apr-18 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 0.1 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 25-Apr-18 | 831 | Marine Harvest Canada | Shelter Pass | 50.88414 | -127.50040 | 3.4 | 0.3 | 0.3 | Statistical agreement between DFO and Industry counts | 1 |
| 26-Apr-18 | 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 0.7 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Apr-18 | 7054 | Marine Harvest Canada | Wanx tails | 50.89322 | -127.89568 | 3.4 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 27-Apr-18 | 821 | Marine Harvest Canada | Glacier Falls | 50.84785 | -126.31921 | 3.3 | 0.2 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 7-May-18 | 1762 | Grieg Seafood BC | Gore | 49.64660 | -126.43167 | 2.4 | 11.9 | 11.5 | Statistical agreement between DFO and Industry counts | 2 |
| 7-May-18 | 1700 | Grieg Seafood BC | Muchalat South | 49.64012 | -126.32735 | 2.4 | 2.7 | 3.0 | Statistical agreement between DFO and Industry counts | 2 |
| 8-May-18 | 1862 | Grieg Seafood BC | Hecate | 49.86799 | -126.7573 | 2.4 | 0.3 | 0.5 | Statistical agreement between DFO and Industry counts | 1 |
| 8-May-18 | 1079 | Grieg Seafood BC | Steamer | 49.88680 | -126.79110 | 2.4 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 16-May-18 | 1698 | Grieg Seafood BC | Ahlstrom | 49.77930 | -124.15395 | 3.1 | 0.1 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 16-May-18 | 1697 | Grieg Seafood BC | Culloden | 49.79595 | -124.10162 | 3.1 | 0.0 | 0.0 | Statistical comparison not possible | 2 |
| 16-May-18 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.0 | 0.0 | Statistical agreement between DFO and Industry counts | 2 |
| 28-May-18 | 540 | Cermaq Canada | Fortune Channel | 49.23503 | -125.75174 | 2.3 | 3.2 | 3.9 | Statistical agreement between DFO and Industry counts | 1 |
| 29-May-18 | 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 4.6 | 5.3 | Statistical agreement between DFO and Industry counts | 1 |
| 29-May-18 | 6668 | Cermaq Canada | Plover Point | 49.21433 | -125.76693 | 2.3 | 4.2 | 7.0 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 30-May-18 | 526 | Cermaq Canada | Rant Point | 49.25670 | -125.84153 | 2.3 | 9.7 | 12.2 | Statistical agreement between DFO and Industry counts | 2 |
| 30-May-18 | 527 | Cermaq Canada | Saranac Island | 49.24803 | -125.90671 | 2.3 | 18.4 | 21.8 | Statistical agreement between DFO and Industry counts | 2 |
| 6-Jun-18 | 304 | Cermaq Canada | Raza Island | 50.32159 | -125.00882 | 3.2 | 0.3 | 0.4 | Statistical agreement between DFO and Industry counts | 1 |
| 6-Jun-18 | 306 | Cermaq Canada | Venture Point | 50.30241 | -125.33778 | 3.2 | 0.0 | 0.0 | Statistical comparison not possible; Audit included only one pen | 2 |
| 7-Jun-18 | 380 | Marine Harvest Canada | Sonora Point | 50.42362 | -125.30517 | 3.2 | 0.2 | 0.0 | Statistical agreement between DFO and Industry counts | 1 |
| 27-Jun-18 | 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0.5 | 0.1 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 2 |
| 9-Jul-18 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 17-Jul-18 | 1350 | Marine Harvest Canada | Shelter Bay | 50.96555 | -127.45345 | 3.4 | 1.3 | 1.3 | Statistical agreement between DFO and Industry counts | 2 |
| 18-Jul-18 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 0.4 | 0.1 | Statistical agreement between DFO and Industry counts | 1 |
| 19-Jul-18 | 821 | Marine Harvest Canada | Glacier Falls | 50.84785 | -126.31921 | 3.3 | 0.6 | 0.8 | Statistical agreement between DFO and Industry counts | 2 |
| 28-Aug-18 | 526 | Cermaq Canada | Rant Point | 49.25670 | -125.84153 | 2.3 | 15.7 | 20.5 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Sep-18 | 871 | Grieg Seafood BC | Barnes Bay | 50.32437 | -125.26039 | 3.2 | 0.9 | 1.4 | Statistical agreement between DFO and Industry counts | 2 |
| 10-Oct-18 | 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 2.9 | 2.6 | Statistical agreement between DFO and Industry counts | 1 |
| 10-Oct-18 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 1.0 | 0.8 | Statistical agreement between DFO and Industry counts | 1 |
| 11-Oct-18 | 465 | Marine Harvest Canada | Swanson | 50.61871 | -126.70473 | 3.3 | 0.3 | 0.7 | Statistically significant difference between DFO and Industry counts; Difference attributed to sample selection, methodology meets requirements outlined in licence conditions | 1 |
| 22-Oct-18 | 332 | Grieg Seafood BC | Salten | 49.61535 | -123.83407 | 3.1 | 0.4 | 0.3 | Statistical agreement between DFO and Industry counts; Audit included only 2 pens. | 2 |

| | | | | | | | | | | |
|-----------|------|-----------------------|----------------|----------|------------|-----|-----|-----|---|---|
| 24-Oct-18 | 1849 | Grieg Seafood BC | Muchalat North | 49.64394 | -126.33953 | 2.4 | 0.0 | 0.0 | Statistical comparison not possible | 1 |
| 31-Oct-18 | 211 | Marine Harvest Canada | Okisollo | 50.30946 | -125.31618 | 3.2 | 0.1 | 0.1 | Statistical agreement between DFO and Industry counts | 2 |
| 21-Nov-18 | 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 2.5 | 3.5 | Statistical agreement between DFO and Industry counts | 2 |
| 16-Jan-19 | 1288 | Marine Harvest Canada | Doyle Island | 50.81456 | -127.48698 | 3.4 | 1.3 | 1.4 | Statistical agreement between DFO and Industry counts | 2 |
| 23-Jan-19 | 1825 | Grieg Seafood BC | Noo-ia | 50.60799 | -126.36301 | 3.3 | 0.3 | 0.2 | Statistical agreement between DFO and Industry counts | 1 |
| 29-Jan-19 | 1862 | Grieg Seafood BC | Hecate | 49.86799 | -126.7573 | 2.4 | 0.6 | 0.3 | Statistical agreement between DFO and Industry counts | 2 |
| 20-Feb-19 | 1691 | Marine Harvest Canada | Kid Bay | 52.80048 | -128.40111 | 3.5 | 0.4 | 0.4 | Statistical agreement between DFO and Industry counts | 2 |
| 26-Feb-19 | 1507 | Cermaq Canada | Millar Channel | 49.37622 | -126.09003 | 2.3 | 0.0 | 0.0 | Statistical comparison not possible | 1 |
| 26-Feb-19 | 314 | Cermaq Canada | Ross Pass | 49.32437 | -126.04849 | 2.3 | 0.0 | 0.0 | Statistical comparison not possible | 1 |
| 27-Feb-19 | 1537 | Cermaq Canada | Bare Bluff | 49.32702 | -125.79902 | 2.3 | 6.7 | 5.5 | Statistical agreement between DFO and Industry counts | 2 |
| 7-Mar-19 | 100 | Marine Harvest Canada | Lees Bay | 50.41063 | -125.70029 | 3.2 | 0.3 | 0.2 | Statistical agreement between DFO and Industry counts | 2 |

Wilkinson, Davida

From: Sandberg, Krista
Sent: Tuesday, May 14, 2019 12:03 PM
To: Paylor, Adrienne
Subject: RE: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

I confirm everything that Howie says. Latest inventory report from Bedwell says that they plan to be empty by the end of May so there are likely very few fish left at this point.

Links to public reports if you need to share them:

Industry Abundances – posted to March: <http://open.canada.ca/data/en/dataset/3cafbe89-c98b-4b44-88f1-594e8d28838d>

DFO Sea Lice Audits – Q1 sent for posting so should be up very soon: <http://open.canada.ca/data/en/dataset/5cfd93bd-b3ee-4b0b-8816-33d388f6811d>

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



Government
of Canada

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du Canada

Canada

From: Paylor, Adrienne
Sent: May-14-19 11:53 AM
To: Sandberg, Krista
Subject: FW: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

FYI....what Howie had to say

From: Manchester, Howie
Sent: May-14-19 11:49 AM
To: Paylor, Adrienne
Subject: RE: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Yes, Bedwell was one of the three farms over threshold going into the outmigration period, the other two were Bare Bluff and Plover. Bare Bluff had been harvesting before March and completely harvested out by March 31, Plover was treated with H2O2 in early March and Bedwell began accelerated harvest on April 1. Zac spoke to their veterinarian [REDACTED] two weeks ago and he was satisfied with their progress to stay within the requirements of the conditions of licence. Unfortunately we don't have any new information since Zac's last conversation, we are expecting to have the April numbers tomorrow I believe.

Howie

From: Paylor, Adrienne
Sent: May-14-19 11:36 AM

s.19(1)

To: Manchester, Howie

Subject: RE: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Awesome thanks. Do we know anything about Bedwell East in her questions below?

From: Manchester, Howie

Sent: May-14-19 11:34 AM

To: Paylor, Adrienne

Subject: RE: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Hi Adrienne,

I think the media lines below cover what has been occurring. Some comments that could be added:

During the outmigration this year there has been three farms of there has been constant communications between the DFO veterinarian and Cermaq veterinarian, there have been three farms out of nine that were over threshold in the outmigration period. Responses to the over thresholds have been dealt with through accelerated harvest or immediate Hydrogen peroxide treatments to DFO's satisfaction, harvest rates have been at a level to ensure that overall sea lice abundance has decreased as required in the Aquaculture Conditions of Licence.

Sea Lice numbers in the fish treated with Lufenuron has been far below threshold during the outmigration period, DFO biologist will be in the Clayquot area in early June to audit the lice numbers at 5 of the 8 remaining Cermaq sites as part of the Fish health audit and surveillance program.

Howie

From: Paylor, Adrienne

Sent: May-14-19 10:35 AM

To: Manchester, Howie

Subject: FW: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Howie I'm just reviewing now but will check with you before I respond in case there is something you think we should add.

From: McCorquodale, Brenda

Sent: May-14-19 10:25 AM

To: Imbeau, Michelle; Paylor, Adrienne; Doucette, Claire

Cc: McConnachie, Sarah; Webb, Allison

Subject: Re: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Adrienne - for your review.

Brenda

A/Director, Aquaculture Management Division (April 18, 2019 - May 15, 2019)

Regional Manager, Aquaculture Resource Management

Fisheries and Oceans Canada

Gestionnaire régionale des ressources, Direction des pêches

Pêches et Océans Canada

1965 Island Diesel Way | Nanaimo, BC | Nanaimo, CB | V9S 5W8

Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

Telephone | Téléphone: [250-754-0367](tel:250-754-0367)

----- Original message -----

From: "Imbeau, Michelle" <Michelle.Imbeau@dfo-mpo.gc.ca>

Date: 2019-05-14 10:19 AM (GMT-08:00)

To: "McCorquodale, Brenda" <Brenda.McCorquodale@dfo-mpo.gc.ca>, "Paylor, Adrienne" <Adrienne.Paylor@dfo-mpo.gc.ca>, "Doucette, Claire" <Claire.Doucette@dfo-mpo.gc.ca>

Cc: "McConnachie, Sarah" <Sarah.Mcconnachie@dfo-mpo.gc.ca>, "Webb, Allison" <Allison.Webb@dfo-mpo.gc.ca>

Subject: FW: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Hello Brenda, Claire and Adrienne

Michelle Rainer is away and we have this urgent media inquiry about sea lice in Clayoquot Sound. A response is due to the reporter today.

I found these media lines from April. Are these suffice to address the reporter's questions?:

- The abundance of sea lice on marine salmon farms is influenced by seasonal and year-to-year variations in ocean salinity and temperature, as well as the number and species of wild salmon returning to an area. **Approved**
- In Clayoquot sound over the winter/spring of 2017-2018, the typical drop in salinity that comes with rains did not occur. This higher salinity resulted in increased lice production in the region and exacerbated the lice levels on farms. **Approved**
- In early 2018, Fisheries and Oceans Canada (DFO) collected sea lice from Cermaq Canada's Bawden site in the Clayoquot area and sent them to the BC Centre for Aquatic Health Sciences for analysis, which confirmed emamectin benzoate (SLICE®) resistance. **Approved**
- Due to continuing high ocean salinity in 2019, there is concern that sea lice levels may once again be high during the critical juvenile outmigration period this spring. DFO is working closely with Cermaq Canada staff to ensure that the company is prepared for the outmigration period and that its licence requirements are understood and followed. **New**
- Under the Pacific Aquaculture Regulations, DFO requires salmon farming companies to regularly monitor and manage sea lice levels at their facilities in BC. DFO also regularly conducts assessments of sea lice abundance at these facilities. **approved**
- Companies in BC must submit a lice reduction plan if monitoring shows sea lice levels higher than three motile sea lice per farmed fish during the wild salmon outmigration period from March 1 to June 30 of each year. Motile lice are those at the free-moving stages of their life cycle. **Approved**

Do we want to mention Lufenuron to the reporter??

- Health Canada has issued an emergency drug release (EDR) to Cermaq Canada for the use of Lufenuron. Drugs used in salmon aquaculture are approved and managed by Health Canada. **new**
- Lufenuron is used widely and safely in veterinary medicine as a topical flea/parasite preventative for dogs and cats. **new**
- When used to treat salmon, it is not administered in the ocean environment. Rather, fish are treated in land-based, freshwater facilities prior to transfer to marine sites. **New**
- DFO was not involved in the application or review process for the Lufenuron EDR but we were notified by Cermaq Canada of its use in their sea lice mitigation plan. DFO supports the use of varied treatment applications to ensure

that sea lice resistance to available drugs does not become a widespread problem. Varied treatment choices are consistent with a responsible integrated pest management approach to sea lice mitigation. new

• Upon ocean entry, the fish should be protected from sea lice infestation for up to 6 to 9 months, thus reducing reliance on and other treatments that may be stressful to fish. new

Responsive on results of investigation

- The Department has reviewed Cermaq Canada's sea lice management practices in this region and, in March 2019, issued a warning letter to Cermaq Canada Ltd. for violation of certain conditions of licence. In total, 7 compliance issues were found. new
- DFO is working closely with Cermaq Canada staff to ensure that the company is prepared for the upcoming wild salmon out migration period and that its licence requirements are understood and followed. new

From: [REDACTED]
Sent: Monday, May 13, 2019 1:03 PM
To: 'media.xncr@dfo-mpo.gc.ca';
Subject: CTV NATIONAL NEWS - REQUEST FOR COMMENT OR WRITTEN STATMENT - SEA LICE OUTBREAKS

Greetings

I am writing to you regarding sea lice outbreaks on the west and east coast of Vancouver Island.

In talking with different marine conservation groups, it appears there is an estimated 75% sea lice infection rate among young wild salmon in the Clayoquot Sound . It's also estimated there's a 90% infection rate right now in the Broughton. These outbreaks appear to be close to several fish farms (predominantly Cermaq).

1. Can you tell me what your teams are finding in terms of sea lice infection rate in these areas? Do you have teams out there monitoring and tracking the outbreak?
2. What is the current lice infection rate at the Bedwell East fish Farm? It is my understanding that it has been x5 over DFO's sea lice limit. Have any fines been issued to Cermaq for consistent heavy lice loads? What legal mechanism are you using to ensure that farms with heavy lice load comply with your guidelines and regulations?
3. The maximum limit for lice prevalence on farmed fish in Norway is much more strict than what we have here in BC. Why is DFO not reducing the total lice load limit per fish on BC fish farms? Or at least, why not do so during the critical out migration period of juvenile salmon?
4. Also, I have obtained several ATIP documents (ATIP A-2018-00799). The documents appear to suggest that DFO staff have flagged on previous occasions that there are possible problems around conditions of license and enforcement. Various staff appear to call for changes to the system and a strengthening of COLs/enforcement (Ian Keith and Neil Jensen mention this. Zac Waddinton and Claire Doucette also refer to the topic). What is DFO doing to improve and strengthen licence conditions /enforcement to help combat the continual sea lice problem on BC's fish farms?

s.19(1)

Hoping to get some answers to my questions by 4pmEST Tuesday May 14th.

Thank you in advance

[REDACTED] / CTV National

Wilkinson, Davida

From: Sandberg, Krista
Sent: Wednesday, May 15, 2019 10:54 AM
To: Paylor, Adrienne
Subject: FW: 2019Q1 Sea Lice audit report for your review

FYI the sea lice audit report is now current to March 2019

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Aquacomms Public Reporting/Aquacomms Rapports Publics (DFO/MPO)
Sent: May-14-19 4:09 PM
To: Sandberg, Krista
Subject: RE: 2019Q1 Sea Lice audit report for your review

Thanks Krista,

This report has been updated.

Do you also have a list of any reports that are only updated if there is an event? I remember there used to be some like this. Laura suggested that I check in about this so we can update the report coverage period on Opendata for these so that it doesn't appear as if we aren't reporting on the data – just that there is no data to report.

Feel free to give me a call if you have any questions.

Christina

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: May-14-19 3:56 PM
To: Aquacomms Public Reporting/Aquacomms Rapports Publics (DFO/MPO) <DFO.Aquacomms_Public_Reporting-Aquacomms_Rapports_Publics.MPO@dfo-mpo.gc.ca>
Subject: RE: 2019Q1 Sea Lice audit report for your review

Ok, our reporting quarters are always calendar rather than fiscal quarters. To avoid confusion I will try to remember to specify the months for you.

Cheers,
Krista.

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835

s.16(2)(c)

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From: Aquacomms Public Reporting/Aquacomms Rapports Publics (DFO/MPO)
Sent: May-14-19 3:54 PM
To: Sandberg, Krista
Subject: RE: 2019Q1 Sea Lice audit report for your review

That's what I was looking for – March 31. This info. is needed for Opendata.

The information in the date column doesn't always correspond with the coverage period for the report. And the reporting quarters are not the same as the financial quarters so I just wanted to confirm.

Yes, dates would be great with each report.

Thanks,

Christina Larabie

Digital Communications Advisor
Fisheries and Oceans Canada/Government of Canada
Christina.Larabie@dfo-mpo.gc.ca / Tel: 604-499-5808

Agente des communications numériques
Pêches et Océans Canada/Gouvernement du Canada
Christina.Larabie@dfo-mpo.gc.ca / Tél. 604-499-5808

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: May-14-19 3:49 PM
To: Aquacomms Public Reporting/Aquacomms Rapports Publics (DFO/MPO) <DFO.Aquacomms_Public_Reporting-Aquacomms_Rapports_Publics.MPO@dfo-mpo.gc.ca>
Subject: RE: 2019Q1 Sea Lice audit report for your review

It is all the sea lice audits that were completed in quarter 1 –January through March. The dates are in the report. I'm not exactly sure what you're asking for – would you rather I just said Jan-March 2019 instead of Q1?

Krista Sandberg
Aquaculture Data and Public Reporting Coordinator |
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From: Aquacomms Public Reporting/Aquacomms Rapports Publics (DFO/MPO)
Sent: May-14-19 3:30 PM
To: Sandberg, Krista
Subject: RE: 2019Q1 Sea Lice audit report for your review

Hi Krista,

s.16(2)(c)

What's the end of the coverage period for this report – end of Q1? Could you provide me with these dates moving forward.

Thanks,

Christina

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: May-14-19 12:15 PM
To: Aquacomms Public Reporting/Aquacomms Rapports Publics (DFO/MPO) <DFO.Aquacomms_Public_Reporting-Aquacomms_Rapports_Publics.MPO@dfo-mpo.gc.ca>
Subject: FW: 2019Q1 Sea Lice audit report for your review

Hi Christina,

The Q1 Sea Lice Audit report is approved and ready to be posted. Please see the link below.

Thank you,
Krista.

Krista Sandberg
Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
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From: Paylor, Adrienne
Sent: May-14-19 11:52 AM
To: Sandberg, Krista
Subject: RE: 2019Q1 Sea Lice audit report for your review

Approved thanks,
Adrienne

From: Sandberg, Krista
Sent: May-14-19 11:50 AM
To: Paylor, Adrienne
Subject: 2019Q1 Sea Lice audit report for your review

Hi Adrienne,

The 2019 Q1 Sea Lice Audit report is ready for your review. Please review the red tab.

[\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\3. Audit Table - Quarterly\Sea Lice Audit 2011-ongoing for WEB.xlsx](#)

Cheers,
Krista.

Krista Sandberg
Senior Data and Public Reporting Coordinator |

s.16(2)(c)

Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
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No further information has been removed or severed from this page

Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, May 24, 2019 3:44 PM
To: Paylor, Adrienne
Subject: FW: New Fish Health Reporting Templates - BCSFA

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
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From: Waddington, Zac
Sent: February-07-19 2:49 PM
To: Ruth Salmon
Cc: Sandberg, Krista
Subject: RE: New Fish Health Reporting Templates - BCSFA

Thanks so much for reaching out to the industry and getting that feedback for us. I will touch base with [REDACTED] directly to address his comment below. We will be issuing the bulletin with the new templates very shortly.

Zac

From: [REDACTED]
Sent: February-07-19 6:07 AM
To: Waddington, Zac
Subject: FW: New Fish Health Reporting Templates - BCSFA

Hi Zac,

All the companies are just fine with using the forms now. The only comment I received, that you may want to consider, was from [REDACTED] See below.

Feel free to say that you have support from the BCSFA to distribute and use these new reporting tools prior to the issuance of the new Conditions of Licence in 2022.

Thanks for reaching out,

Regards,

s.16(2)(c)

s.19(1)



From: [REDACTED]
Date: Wednesday, February 6, 2019 at 11:29 AM

To: [REDACTED]
[REDACTED]

Cc: [REDACTED]
[REDACTED]

Subject: RE: New Fish Health Reporting Templates - BCSFA

Good morning [REDACTED]

[REDACTED]
The one issue I have is with the sea lice reporting template

Column "E" automatically calculates the number of sea lice on a farm based on the average motile lice and the fish inventory. I understand that this may be a "close to" or approximation, but don't believe it is an "Absolute Sea Lice Inventory"...just looking for correctness

| E |
|------------------------------------|
| Absolute Sea Lice Inventory |
| Do Not Enter |
| [REDACTED] |

Best regards

[REDACTED]

MOWI CANADA WEST

OFFICE: (250) 850 – 3276 ext [REDACTED]
MOBILE: [REDACTED]
MAIL: [REDACTED]

OFFICE: 124-1334 Island Hwy
Campbell River, BC V9W 8C9
Canada

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Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, May 24, 2019 3:52 PM
To: Paylor, Adrienne
Subject: FW: new reporting templates to go with draft bulletin - FH reporting

These are the comments from Joe C&P

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
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From: Sandberg, Krista
Sent: December-07-18 9:26 AM
To: Knight, Joe
Subject: RE: new reporting templates to go with draft bulletin - FH reporting

Thanks, Joe. [REDACTED] I will pass your comments on to Zac 😊

Krista.

Krista Sandberg

Office | Bureau 250-286-5835
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From: Knight, Joe
Sent: December-06-18 4:02 PM
To: Sandberg, Krista
Subject: RE: new reporting templates to go with draft bulletin - FH reporting

Hey,

Reviewed the material, I think a couple of changes to the bulletin should be done, more or less changing words like "should", "warrants" and "required" with the word **MUST** (and I don't even mind if it's coloured red. I like documents to be crystal clear and the word "must" or "shall" are exactly this. "Should" and "warrants" are not. The document isn't that long so that's not a problem for me, better to be long and clear than short and indistinct.

I see you're in Courtenay tomorrow so if you have time drop me a line and we can discuss (I came to talk with you and you were gone - [REDACTED])

Thx,

Joe Knight

s.16(2)(c)

s.19(1)

s.21(1)(b)

Aquaculture Detachment Supervisor
1520 Tamarac Street
Campbell River, BC V9W 3M5
Office: 250-286-5816
Cell: [REDACTED]
Joe.Knight@dfo-mpo.gc.ca

Even at your best, someone will always have something negative to say. Pursue greatness anyways.
Tony Gaskins

From: Sandberg, Krista
Sent: 2018-December-04 3:19 PM
To: Knight, Joe
Cc: Doucette, Claire; Paylor, Adrienne; Waddington, Zac
Subject: FW: new reporting templates to go with draft bulletin - FH reporting

Hi Joe,

The fish health team has been working towards improving industry reporting with regards to urgent notifications including fish health events, mortality events and sea lice overabundance notifications. Thus, we have created three new structured data templates (attached) to replace our previous system of email notifications and excel reports. We have also drafted a Bulletin that helps to clarify some of the requirements in our current Conditions of Licence. There are no changes in requirements, just increased structure and clarity which will ultimately feed into our enhanced AQUIS modules to allow us to better track events and assess compliance. We have finalized the templates and bulletin and plan on sending this to Allison for review, [REDACTED] prior to distributing to industry. I'm hoping this can be done before the new year so that we can implement our new system in January.

Can you please review these templates and the bulletin from a C&P perspective to ensure that they are consistent with your requirements? Let me know if you would like to go over them in person or if you have any further questions.

Thank you,
Krista.

Krista Sandberg
Office | Bureau 250-286-5835
Cellular | Cellulaire : [REDACTED]



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From: Waddington, Zac
Sent: December-03-18 6:04 PM
To: Paylor, Adrienne
Cc: Sandberg, Krista; Diamond, Maria; Manchester, Howie
Subject: RE: new reporting templates to go with draft bulletin - FH reporting

Please see the attached bulletin and final templates. I think we can say happily that this is the final draft, Maria has polished it up and I think it's ready for distribution. When/if you're happy with it Adrienne, I don't know how it's supposed to go up through the channels, but you can send it and the templates to whomever you feel necessary. Please let me know if you need anything further,

s.16(2)(c)

s.23

Zac

From: Sandberg, Krista
Sent: November-29-18 3:22 PM
To: Paylor, Adrienne
Cc: Waddington, Zac
Subject: new reporting templates to go with draft bulletin - FH reporting

Hi Adrienne,

To go along with the bulletin that you have from Zac to send up to Allison, I think it would be good to include the new templates that will be sent out along with the bulletin. And I should note that they are all very fabulous! I spoke with Dan yesterday and he was pointing out a few holes in our reporting requirements, all of which I was happy to say are now covered with our new templates 😊

Krista.

Krista Sandberg

Aquaculture Data Coordinator | Coordonnateur de données sur l'aquaculture
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Office | Bureau 250-286-5835
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Wilkinson, Davida

From: Sandberg, Krista
Sent: Friday, May 24, 2019 3:53 PM
To: Paylor, Adrienne
Subject: FW: new reporting templates to go with draft bulletin - FH reporting

Bernie thought it was too long, Joe thought it was too soft

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
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From: Sandberg, Krista
Sent: December-07-18 9:29 AM
To: Waddington, Zac
Cc: Paylor, Adrienne
Subject: FW: new reporting templates to go with draft bulletin - FH reporting

Hey Zac,

I asked Joe to review the bulletin from a C&P perspective and he suggests that we need to use some more firm wording, as below. It's good advice I think. Talking with Bernie and Joe yesterday, Bernie says that he thinks the bulletin is too long and if we are just reiterating the licence or details in the templates, we should remove them. I don't necessarily agree and Joe seems to think the length is fine. Might be worth just confirming that we haven't repeated ourselves anywhere but I don't think that's the case.

Krista.

Krista Sandberg

Office | Bureau 250-286-5835
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From: Knight, Joe
Sent: December-06-18 4:02 PM
To: Sandberg, Krista
Subject: RE: new reporting templates to go with draft bulletin - FH reporting

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Reviewed the material, I think a couple of changes to the bulletin should be done, more or less changing words like "should", "warrants" and "required" with the word **MUST** (and I don't even mind if it's coloured red. I like documents to be crystal clear and the word "must" or "shall" are exactly this. "Should" and "warrants" are not. The document isn't that long so that's not a problem for me, better to be long and clear than short and indistinct.

s.16(2)(c)

I see you're in Courtenay tomorrow so if you have time drop me a line and we can discuss (I came to talk with you and you were gone – [REDACTED])

Thx,

Joe Knight
Aquaculture Detachment Supervisor
1520 Tamarac Street
Campbell River, BC V9W 3M5
Office: 250-286-5816
Cell: [REDACTED]
Joe.Knight@dfo-mpo.gc.ca

Even at your best, someone will always have something negative to say. Pursue greatness anyways.
Tony Gaskins

From: Sandberg, Krista
Sent: 2018-December-04 3:19 PM
To: Knight, Joe
Cc: Doucette, Claire; Paylor, Adrienne; Waddington, Zac
Subject: FW: new reporting templates to go with draft bulletin - FH reporting

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Can you please review these templates and the bulletin from a C&P perspective to ensure that they are consistent with your requirements? Let me know if you would like to go over them in person or if you have any further questions.

Thank you,
Krista.

Krista Sandberg
Office | Bureau 250-286-5835
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s.16(2)(c)
s.19(1)
s.21(1)(b)
s.23



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From: Waddington, Zac
Sent: December-03-18 6:04 PM
To: Paylor, Adrienne
Cc: Sandberg, Krista; Diamond, Maria; Manchester, Howie
Subject: RE: new reporting templates to go with draft bulletin - FH reporting

Please see the attached bulletin and final templates. I think we can say happily that this is the final draft, Maria has polished it up and I think it's ready for distribution. When/if you're happy with it Adrienne, I don't know how it's supposed to go up through the channels, but you can send it and the templates to whomever you feel necessary. Please let me know if you need anything further,

Zac

From: Sandberg, Krista
Sent: November-29-18 3:22 PM
To: Paylor, Adrienne
Cc: Waddington, Zac
Subject: new reporting templates to go with draft bulletin - FH reporting

Hi Adrienne,

To go along with the bulletin that you have from Zac to send up to Allison, I think it would be good to include the new templates that will be sent out along with the bulletin. And I should note that they are all very fabulous! I spoke with Dan yesterday and he was pointing out a few holes in our reporting requirements, all of which I was happy to say are now covered with our new templates ☺

Krista.

Krista Sandberg

Aquaculture Data Coordinator | Coordonnateur de données sur l'aquaculture
Aquaculture Management Division | Gestion de l'aquaculture
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Wilkinson, Davida

From: Sandberg, Krista
Sent: Wednesday, May 29, 2019 1:32 PM
To: Paylor, Adrienne
Subject: FW: 2019Q1 sea lice exceedance graph for your review

Hi Adrienne, sea lice graph for your review. See link below.

Krista.

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
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From: McConnachie, Sarah
Sent: May-29-19 12:41 PM
To: Sandberg, Krista
Subject: RE: 2019Q1 sea lice exceedance graph for your review

Approved

Dr. Sarah McConnachie MSc, PhD, DVM

Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Aquaculture Environmental Operations - Fish Health
Courtenay, British Columbia
Telephone | Téléphone: 250-703-0929
Cell Phone | Cellulaire: [REDACTED]
Fax | Télécopieur: 250-703-0921
Sarah.McConnachie@dfo-mpo.gc.ca

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s.19(1)



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From: Sandberg, Krista
Sent: May-15-19 2:44 PM
To: McConnachie, Sarah
Subject: 2019Q1 sea lice exceedance graph for your review

Hi Sarah,

The Q1 sea lice graph is complete and ready for your review: [\\Dcbcvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\2. Exceedance Graphs - Quarterly\SL Zone Level Graph for WEB.xlsx](#)

Also a note that Adrienne has approved the sea lice audit table in your absence since we needed to get it posted ASAP due to media enquiries. It is now online. [REDACTED]

Krista.

Krista Sandberg

Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
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| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 2.3 | 2011 | J | | | 0.1 |
| 2.3 | | F | | | 1.7 |
| 2.3 | | M | 3 | 0.3 | |
| 2.3 | | A | 3 | 0.3 | |
| 2.3 | | M | 3 | 0.5 | |
| 2.3 | | J | 3 | 0.6 | |
| 2.3 | | J | | | 1.0 |
| 2.3 | | A | | | 1.8 |
| 2.3 | | S | | | 1.0 |
| 2.3 | | O | | | 1.3 |
| 2.3 | | N | | | 0.6 |
| 2.3 | | D | | | 0.3 |
| 2.3 | 2012 | J | | | 0.3 |
| 2.3 | | F | | | 0.4 |
| 2.3 | | M | 3 | 0.7 | |
| 2.3 | | A | 3 | 0.7 | |
| 2.3 | | M | 3 | 0.5 | |
| 2.3 | | J | 3 | | |
| 2.3 | | J | | | 0.6 |
| 2.3 | | A | | | |
| 2.3 | | S | | | 0.4 |
| 2.3 | | O | | | 0.1 |
| 2.3 | | N | | | 0.2 |
| 2.3 | | D | | | 0.1 |
| 2.3 | 2013 | J | | | 0.2 |
| 2.3 | | F | | | 0.4 |
| 2.3 | | M | 3 | 0.6 | |
| 2.3 | | A | 3 | 1.3 | |
| 2.3 | | M | 3 | 0.3 | |
| 2.3 | | J | 3 | 0.5 | |
| 2.3 | | J | | | 0.5 |
| 2.3 | | A | | | 0.7 |
| 2.3 | | S | | | 0.3 |

| | | | | | |
|-----|------|---|---|-----|-----|
| 2.3 | | O | | | 0.2 |
| 2.3 | | N | | | 0.2 |
| 2.3 | | D | | | 0.3 |
| 2.3 | 2014 | J | | | 0.4 |
| 2.3 | | F | | | 0.6 |
| 2.3 | | M | 3 | 0.5 | |
| 2.3 | | A | 3 | 0.7 | |
| 2.3 | | M | 3 | 1.1 | |
| 2.3 | | J | 3 | 1.0 | |
| 2.3 | | J | | | 1.0 |
| 2.3 | | A | | | 0.3 |
| 2.3 | | S | | | 0.2 |
| 2.3 | | O | | | 0.1 |
| 2.3 | | N | | | 0.1 |
| 2.3 | | D | | | 0.1 |
| 2.3 | 2015 | J | | | 0.1 |
| 2.3 | | F | | | 0.2 |
| 2.3 | | M | 3 | 0.6 | |
| 2.3 | | A | 3 | 0.8 | |
| 2.3 | | M | 3 | 1.3 | |
| 2.3 | | J | 3 | 1.9 | |
| 2.3 | | J | | | 1.9 |
| 2.3 | | A | | | 2.0 |
| 2.3 | | S | | | 6.9 |
| 2.3 | | O | | | 3.0 |
| 2.3 | | N | | | 0.8 |
| 2.3 | | D | | | 0.8 |
| 2.3 | 2016 | J | | | 0.9 |
| 2.3 | | F | | | 1.1 |
| 2.3 | | M | 3 | 1.1 | |
| 2.3 | | A | 3 | 0.9 | |
| 2.3 | | M | 3 | 1.2 | |
| 2.3 | | J | 3 | 0.9 | |
| 2.3 | | J | | | 1.1 |
| 2.3 | | A | | | 0.8 |
| 2.3 | | S | | | 0.7 |
| 2.3 | | O | | | 0.4 |
| 2.3 | | N | | | 0.3 |
| 2.3 | | D | | | 0.3 |
| 2.3 | 2017 | J | | | 0.8 |
| 2.3 | | F | | | 1.2 |
| 2.3 | | M | 3 | 1.6 | |
| 2.3 | | A | 3 | 1.2 | |
| 2.3 | | M | 3 | 2.3 | |
| 2.3 | | J | 3 | 0.7 | |
| 2.3 | | J | | | 0.9 |
| 2.3 | | A | | | 1.5 |

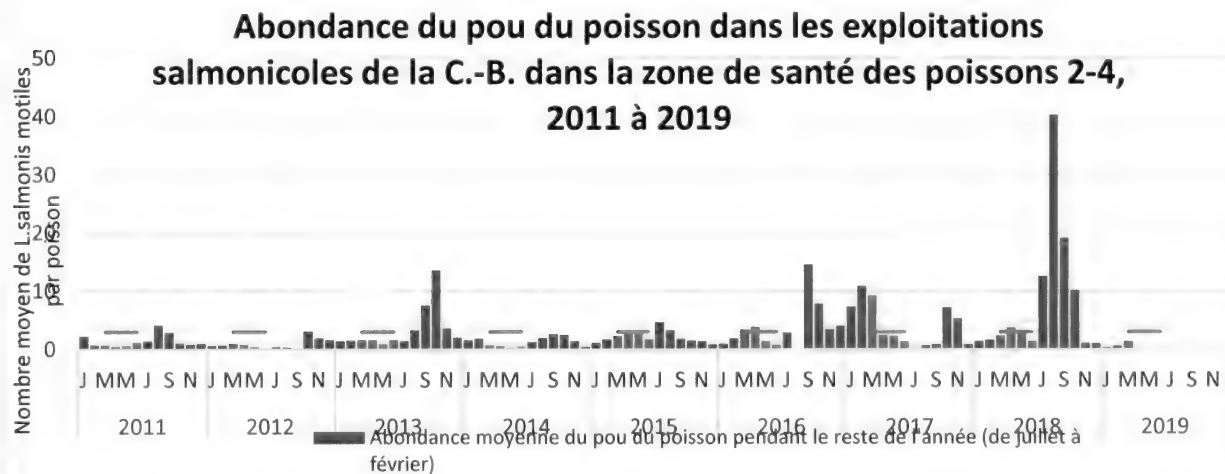
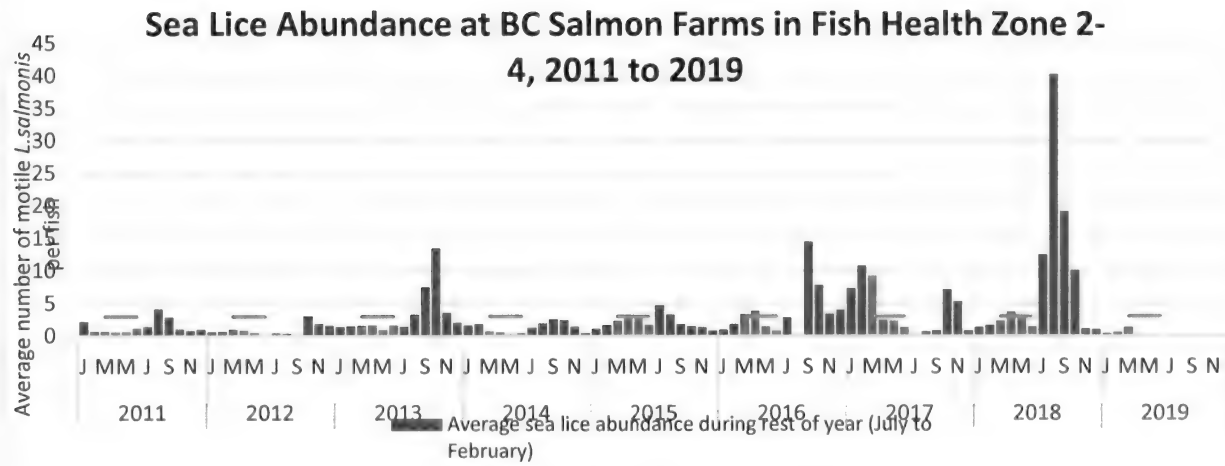
| | | | | | |
|-----|------|---|---|------|------|
| 2.3 | | S | | | 1.7 |
| 2.3 | | O | | | 2.8 |
| 2.3 | | N | | | 1.8 |
| 2.3 | | D | | | 1.7 |
| 2.3 | 2018 | J | | | 2.6 |
| 2.3 | | F | | | 3.5 |
| 2.3 | | M | 3 | 6.6 | |
| 2.3 | | A | 3 | 8.0 | |
| 2.3 | | M | 3 | 12.8 | |
| 2.3 | | J | 3 | 13.1 | |
| 2.3 | | J | | | 10.1 |
| 2.3 | | A | | | 13.3 |
| 2.3 | | S | | | 6.6 |
| 2.3 | | O | | | 2.8 |
| 2.3 | | N | | | 1.3 |
| 2.3 | | D | | | 1.3 |
| 2.3 | 2019 | J | | | 3.8 |
| 2.3 | | F | | | 1.7 |
| 2.3 | | M | 3 | 2.4 | |
| 2.3 | | A | 3 | | |
| 2.3 | | M | 3 | | |
| 2.3 | | J | 3 | | |
| 2.3 | | J | | | |
| 2.3 | | A | | | |
| 2.3 | | S | | | |
| 2.3 | | O | | | |
| 2.3 | | N | | | |
| 2.3 | | D | | | |

Feb 2 24

| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 2.4 | 2011 | J | | | 2.2 |
| 2.4 | | F | | | 0.7 |
| 2.4 | | M | 3 | 0.7 | |
| 2.4 | | A | 3 | 0.5 | |
| 2.4 | | M | 3 | 0.6 | |
| 2.4 | | J | 3 | 1.2 | |
| 2.4 | | J | | | 1.4 |
| 2.4 | | A | | | 4.1 |
| 2.4 | | S | | | 2.9 |
| 2.4 | | O | | | 1.0 |
| 2.4 | | N | | | 0.8 |
| 2.4 | | D | | | 1.0 |
| 2.4 | 2012 | J | | | 0.6 |
| 2.4 | | F | | | 0.6 |
| 2.4 | | M | 3 | 1.0 | |
| 2.4 | | A | 3 | 0.8 | |
| 2.4 | | M | 3 | 0.5 | |
| 2.4 | | J | 3 | | |
| 2.4 | | J | | | 0.4 |
| 2.4 | | A | | | 0.3 |
| 2.4 | | S | | | |
| 2.4 | | O | | | 3.1 |
| 2.4 | | N | | | 1.9 |
| 2.4 | | D | | | 1.6 |
| 2.4 | 2013 | J | | | 1.3 |
| 2.4 | | F | | | 1.4 |
| 2.4 | | M | 3 | 1.6 | |
| 2.4 | | A | 3 | 1.6 | |
| 2.4 | | M | 3 | 0.9 | |
| 2.4 | | J | 3 | 1.6 | |
| 2.4 | | J | | | 1.4 |
| 2.4 | | A | | | 3.3 |
| 2.4 | | S | | | 7.5 |

| | | | | | |
|-----|------|---|---|-----|------|
| 2.4 | | O | | | 13.5 |
| 2.4 | | N | | | 3.6 |
| 2.4 | | D | | | 2.0 |
| 2.4 | 2014 | J | | | 1.6 |
| 2.4 | | F | | | 1.9 |
| 2.4 | | M | 3 | 0.7 | |
| 2.4 | | A | 3 | 0.5 | |
| 2.4 | | M | 3 | 0.3 | |
| 2.4 | | J | 3 | 0.4 | |
| 2.4 | | J | | | 1.2 |
| 2.4 | | A | | | 1.9 |
| 2.4 | | S | | | 2.6 |
| 2.4 | | O | | | 2.5 |
| 2.4 | | N | | | 1.4 |
| 2.4 | | D | | | 0.4 |
| 2.4 | 2015 | J | | | 1.1 |
| 2.4 | | F | | | 1.7 |
| 2.4 | | M | 3 | 2.3 | |
| 2.4 | | A | 3 | 3.0 | |
| 2.4 | | M | 3 | 3.0 | |
| 2.4 | | J | 3 | 1.7 | |
| 2.4 | | J | | | 4.7 |
| 2.4 | | A | | | 3.3 |
| 2.4 | | S | | | 1.8 |
| 2.4 | | O | | | 1.5 |
| 2.4 | | N | | | 1.3 |
| 2.4 | | D | | | 0.8 |
| 2.4 | 2016 | J | | | 0.9 |
| 2.4 | | F | | | 1.8 |
| 2.4 | | M | 3 | 3.4 | |
| 2.4 | | A | 3 | 3.8 | |
| 2.4 | | M | 3 | 1.4 | |
| 2.4 | | J | 3 | 0.8 | |
| 2.4 | | J | | | 2.8 |
| 2.4 | | A | | | |
| 2.4 | | S | | | 14.5 |
| 2.4 | | O | | | 7.8 |
| 2.4 | | N | | | 3.4 |
| 2.4 | | D | | | 4.1 |
| 2.4 | 2017 | J | | | 7.3 |
| 2.4 | | F | | | 10.8 |
| 2.4 | | M | 3 | 9.2 | |
| 2.4 | | A | 3 | 2.5 | |
| 2.4 | | M | 3 | 2.3 | |
| 2.4 | | J | 3 | 1.3 | |
| 2.4 | | J | | | 0.2 |
| 2.4 | | A | | | 0.6 |

| | | | | | |
|-----|------|---|---|-----|------|
| 2.4 | | S | | | 0.8 |
| 2.4 | | O | | | 7.1 |
| 2.4 | | N | | | 5.3 |
| 2.4 | | D | | | 0.8 |
| 2.4 | 2018 | J | | | 1.3 |
| 2.4 | | F | | | 1.6 |
| 2.4 | | M | 3 | 2.3 | |
| 2.4 | | A | 3 | 3.7 | |
| 2.4 | | M | 3 | 2.8 | |
| 2.4 | | J | 3 | 1.4 | |
| 2.4 | | J | | | 12.5 |
| 2.4 | | A | | | 40.2 |
| 2.4 | | S | | | 19.1 |
| 2.4 | | O | | | 10.1 |
| 2.4 | | N | | | 1.0 |
| 2.4 | | D | | | 1.0 |
| 2.4 | 2019 | J | | | 0.3 |
| 2.4 | | F | | | 0.5 |
| 2.4 | | M | 3 | 1.3 | |
| 2.4 | | A | 3 | | |
| 2.4 | | M | 3 | | |
| 2.4 | | J | 3 | | |
| 2.4 | | J | | | |
| 2.4 | | A | | | |
| 2.4 | | S | | | |
| 2.4 | | O | | | |
| 2.4 | | N | | | |
| 2.4 | | D | | | |



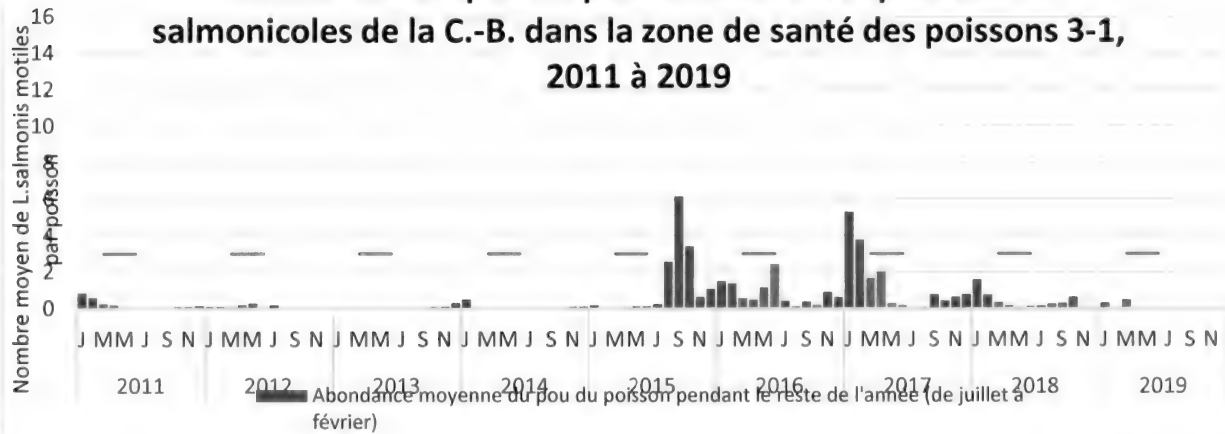
TAB 3 3.1

| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 3.1 | 2011 | J | | | 0.8 |
| 3.1 | | F | | | 0.6 |
| 3.1 | | M | 3 | 0.3 | |
| 3.1 | | A | 3 | 0.2 | |
| 3.1 | | M | 3 | 0.1 | |
| 3.1 | | J | 3 | 0.0 | |
| 3.1 | | J | | | 0.1 |
| 3.1 | | A | | | 0.1 |
| 3.1 | | S | | | 0.0 |
| 3.1 | | O | | | 0.1 |
| 3.1 | | N | | | 0.1 |
| 3.1 | | D | | | 0.2 |
| 3.1 | 2012 | J | | | 0.1 |
| 3.1 | | F | | | 0.1 |
| 3.1 | | M | 3 | 0.1 | |
| 3.1 | | A | 3 | 0.2 | |
| 3.1 | | M | 3 | 0.3 | |
| 3.1 | | J | 3 | | |
| 3.1 | | J | | | 0.2 |
| 3.1 | | A | | | |
| 3.1 | | S | | | |
| 3.1 | | O | | | |
| 3.1 | | N | | | |
| 3.1 | | D | | | |
| 3.1 | 2013 | J | | | |
| 3.1 | | F | | | |
| 3.1 | | M | 3 | | |
| 3.1 | | A | 3 | | |
| 3.1 | | M | 3 | | |
| 3.1 | | J | 3 | | |
| 3.1 | | J | | | |
| 3.1 | | A | | | |
| 3.1 | | S | | | |

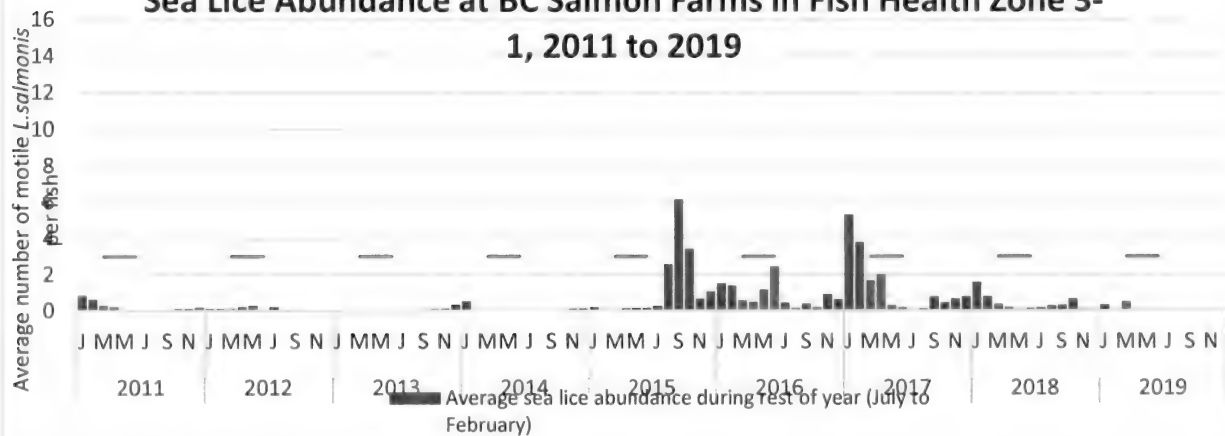
| | | | | | |
|-----|------|---|---|-----|-----|
| 3.1 | | O | | | 0.1 |
| 3.1 | | N | | | 0.1 |
| 3.1 | | D | | | 0.3 |
| 3.1 | 2014 | J | | | 0.5 |
| 3.1 | | F | | | 0.0 |
| 3.1 | | M | 3 | | |
| 3.1 | | A | 3 | | |
| 3.1 | | M | 3 | 0.0 | |
| 3.1 | | J | 3 | 0.0 | |
| 3.1 | | J | | | |
| 3.1 | | A | | | |
| 3.1 | | S | | | |
| 3.1 | | O | | | 0.0 |
| 3.1 | | N | | | 0.1 |
| 3.1 | | D | | | 0.1 |
| 3.1 | 2015 | J | | | 0.2 |
| 3.1 | | F | | | 0.1 |
| 3.1 | | M | 3 | 0.1 | |
| 3.1 | | A | 3 | 0.1 | |
| 3.1 | | M | 3 | 0.1 | |
| 3.1 | | J | 3 | 0.1 | |
| 3.1 | | J | | | 0.2 |
| 3.1 | | A | | | 2.6 |
| 3.1 | | S | | | 6.1 |
| 3.1 | | O | | | 3.4 |
| 3.1 | | N | | | 0.6 |
| 3.1 | | D | | | 1.1 |
| 3.1 | 2016 | J | | | 1.5 |
| 3.1 | | F | | | 1.4 |
| 3.1 | | M | 3 | 0.6 | |
| 3.1 | | A | 3 | 0.5 | |
| 3.1 | | M | 3 | 1.2 | |
| 3.1 | | J | 3 | 2.4 | |
| 3.1 | | J | | | 0.4 |
| 3.1 | | A | | | 0.1 |
| 3.1 | | S | | | 0.4 |
| 3.1 | | O | | | 0.2 |
| 3.1 | | N | | | 0.9 |
| 3.1 | | D | | | 0.6 |
| 3.1 | 2017 | J | | | 5.3 |
| 3.1 | | F | | | 3.8 |
| 3.1 | | M | 3 | 1.7 | |
| 3.1 | | A | 3 | 2.0 | |
| 3.1 | | M | 3 | 0.3 | |
| 3.1 | | J | 3 | 0.2 | |
| 3.1 | | J | | | 0.1 |
| 3.1 | | A | | | 0.1 |

| | | | | | |
|-----|------|---|---|-----|-----|
| 3.1 | | S | | | 0.8 |
| 3.1 | | O | | | 0.4 |
| 3.1 | | N | | | 0.6 |
| 3.1 | | D | | | 0.8 |
| 3.1 | 2018 | J | | | 1.6 |
| 3.1 | | F | | | 0.8 |
| 3.1 | | M | 3 | 0.3 | |
| 3.1 | | A | 3 | 0.2 | |
| 3.1 | | M | 3 | 0.1 | |
| 3.1 | | J | 3 | 0.1 | |
| 3.1 | | J | | | 0.2 |
| 3.1 | | A | | | 0.3 |
| 3.1 | | S | | | 0.3 |
| 3.1 | | O | | | 0.6 |
| 3.1 | | N | | | 0.1 |
| 3.1 | | D | | | n/a |
| 3.1 | 2019 | J | | | 0.3 |
| 3.1 | | F | | | n/a |
| 3.1 | | M | 3 | 0.5 | |
| 3.1 | | A | 3 | | |
| 3.1 | | M | 3 | | |
| 3.1 | | J | 3 | | |
| 3.1 | | J | | | |
| 3.1 | | A | | | |
| 3.1 | | S | | | |
| 3.1 | | O | | | |
| 3.1 | | N | | | |
| 3.1 | | D | | | |

Abondance du pou du poisson dans les exploitations salmonicoles de la C.-B. dans la zone de santé des poissons 3-1, 2011 à 2019



Sea Lice Abundance at BC Salmon Farms in Fish Health Zone 3-1, 2011 to 2019



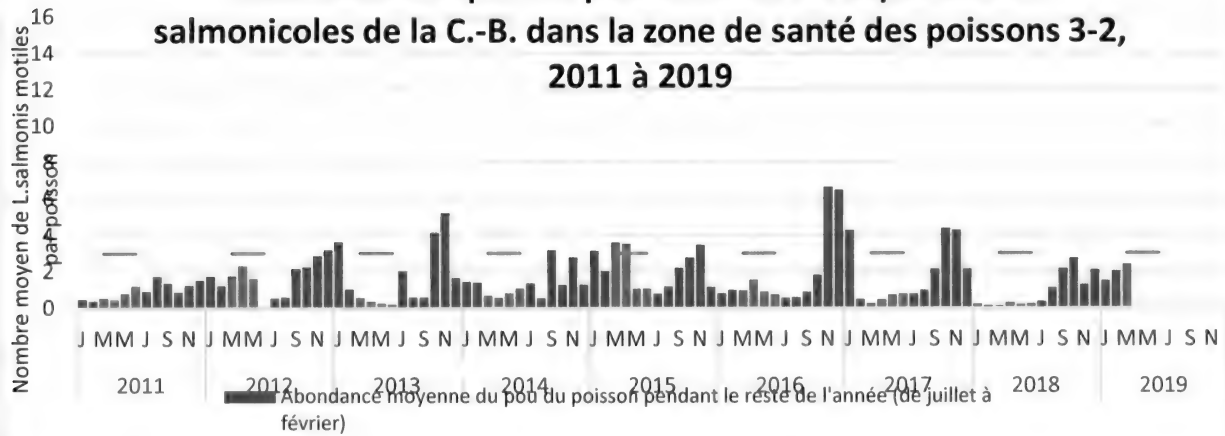
TAB04 -3.2

| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 3.2 | 2011 | J | | | 0.5 |
| 3.2 | | F | | | 0.4 |
| 3.2 | | M | 3 | 0.6 | |
| 3.2 | | A | 3 | 0.5 | |
| 3.2 | | M | 3 | 0.8 | |
| 3.2 | | J | 3 | 1.2 | |
| 3.2 | | J | | | 0.9 |
| 3.2 | | A | | | 1.7 |
| 3.2 | | S | | | 1.4 |
| 3.2 | | O | | | 0.9 |
| 3.2 | | N | | | 1.3 |
| 3.2 | | D | | | 1.5 |
| 3.2 | 2012 | J | | | 1.7 |
| 3.2 | | F | | | 1.2 |
| 3.2 | | M | 3 | 1.8 | |
| 3.2 | | A | 3 | 2.3 | |
| 3.2 | | M | 3 | 1.6 | |
| 3.2 | | J | 3 | | |
| 3.2 | | J | | | 0.6 |
| 3.2 | | A | | | 0.6 |
| 3.2 | | S | | | 2.2 |
| 3.2 | | O | | | 2.3 |
| 3.2 | | N | | | 2.9 |
| 3.2 | | D | | | 3.2 |
| 3.2 | 2013 | J | | | 3.6 |
| 3.2 | | F | | | 1.0 |
| 3.2 | | M | 3 | 0.6 | |
| 3.2 | | A | 3 | 0.4 | |
| 3.2 | | M | 3 | 0.3 | |
| 3.2 | | J | 3 | 0.2 | |
| 3.2 | | J | | | 2.0 |
| 3.2 | | A | | | 0.6 |
| 3.2 | | S | | | 0.6 |

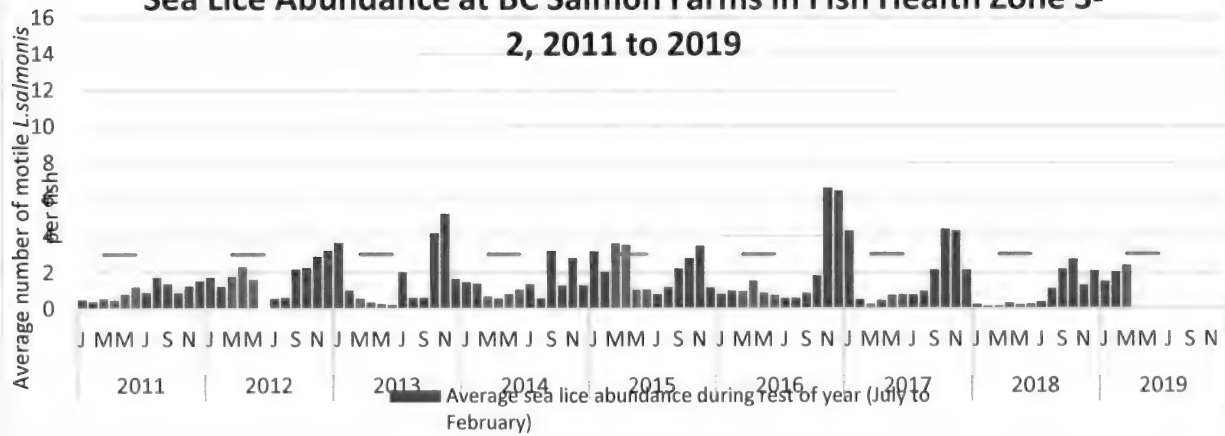
| | | | | | |
|-----|------|---|---|-----|-----|
| 3.2 | | O | | | 4.1 |
| 3.2 | | N | | | 5.2 |
| 3.2 | | D | | | 1.7 |
| 3.2 | 2014 | J | | | 1.5 |
| 3.2 | | F | | | 1.4 |
| 3.2 | | M | 3 | 0.7 | |
| 3.2 | | A | 3 | 0.6 | |
| 3.2 | | M | 3 | 0.8 | |
| 3.2 | | J | 3 | 1.1 | |
| 3.2 | | J | | | 1.4 |
| 3.2 | | A | | | 0.6 |
| 3.2 | | S | | | 3.2 |
| 3.2 | | O | | | 1.3 |
| 3.2 | | N | | | 2.8 |
| 3.2 | | D | | | 1.3 |
| 3.2 | 2015 | J | | | 3.1 |
| 3.2 | | F | | | 2.0 |
| 3.2 | | M | 3 | 3.6 | |
| 3.2 | | A | 3 | 3.5 | |
| 3.2 | | M | 3 | 1.1 | |
| 3.2 | | J | 3 | 1.1 | |
| 3.2 | | J | | | 0.8 |
| 3.2 | | A | | | 1.2 |
| 3.2 | | S | | | 2.2 |
| 3.2 | | O | | | 2.8 |
| 3.2 | | N | | | 3.4 |
| 3.2 | | D | | | 1.2 |
| 3.2 | 2016 | J | | | 0.8 |
| 3.2 | | F | | | 1.0 |
| 3.2 | | M | 3 | 1.0 | |
| 3.2 | | A | 3 | 1.5 | |
| 3.2 | | M | 3 | 0.9 | |
| 3.2 | | J | 3 | 0.7 | |
| 3.2 | | J | | | 0.5 |
| 3.2 | | A | | | 0.6 |
| 3.2 | | S | | | 0.9 |
| 3.2 | | O | | | 1.8 |
| 3.2 | | N | | | 6.6 |
| 3.2 | | D | | | 6.5 |
| 3.2 | 2017 | J | | | 4.3 |
| 3.2 | | F | | | 0.5 |
| 3.2 | | M | 3 | 0.2 | |
| 3.2 | | A | 3 | 0.5 | |
| 3.2 | | M | 3 | 0.7 | |
| 3.2 | | J | 3 | 0.8 | |
| 3.2 | | J | | | 0.8 |
| 3.2 | | A | | | 1.0 |

| | | | | | |
|-----|------|---|---|-----|-----|
| 3.2 | | S | | | 2.1 |
| 3.2 | | O | | | 4.4 |
| 3.2 | | N | | | 4.3 |
| 3.2 | | D | | | 2.1 |
| 3.2 | 2018 | J | | | 0.2 |
| 3.2 | | F | | | 0.1 |
| 3.2 | | M | 3 | 0.1 | |
| 3.2 | | A | 3 | 0.3 | |
| 3.2 | | M | 3 | 0.2 | |
| 3.2 | | J | 3 | 0.2 | |
| 3.2 | | J | | | 0.4 |
| 3.2 | | A | | | 1.1 |
| 3.2 | | S | | | 2.2 |
| 3.2 | | O | | | 2.7 |
| 3.2 | | N | | | 1.3 |
| 3.2 | | D | | | 2.1 |
| 3.2 | 2019 | J | | | 1.5 |
| 3.2 | | F | | | 2.0 |
| 3.2 | | M | 3 | 2.4 | |
| 3.2 | | A | 3 | | |
| 3.2 | | M | 3 | | |
| 3.2 | | J | 3 | | |
| 3.2 | | J | | | |
| 3.2 | | A | | | |
| 3.2 | | S | | | |
| 3.2 | | O | | | |
| 3.2 | | N | | | |
| 3.2 | | D | | | |

Abondance du pou du poisson dans les exploitations salmonicoles de la C.-B. dans la zone de santé des poissons 3-2, 2011 à 2019



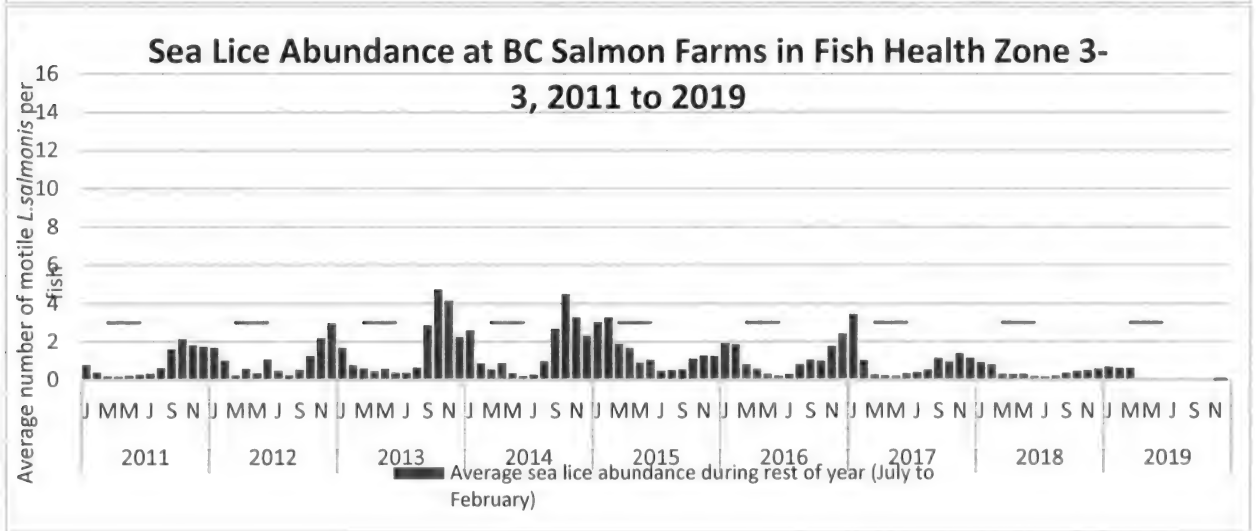
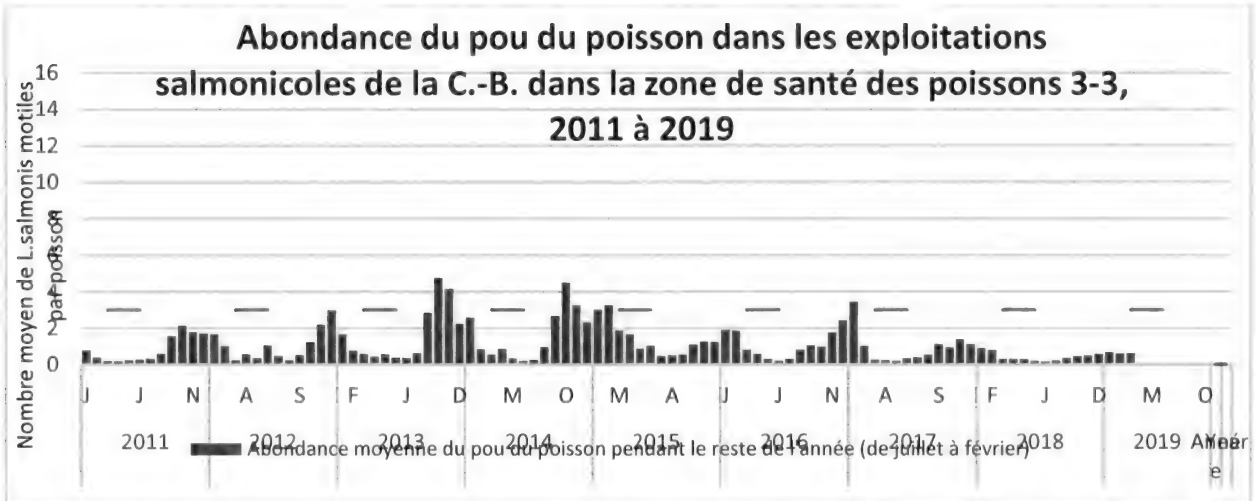
Sea Lice Abundance at BC Salmon Farms in Fish Health Zone 3-2, 2011 to 2019



| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 3.3 | 2011 | J | | | 0.8 |
| 3.3 | | F | | | 0.4 |
| 3.3 | | M | 3 | 0.2 | |
| 3.3 | | A | 3 | 0.2 | |
| 3.3 | | M | 3 | 0.2 | |
| 3.3 | | J | 3 | 0.3 | |
| 3.3 | | J | | | 0.3 |
| 3.3 | | A | | | 0.6 |
| 3.3 | | S | | | 1.6 |
| 3.3 | | O | | | 2.1 |
| 3.3 | | N | | | 1.8 |
| 3.3 | | D | | | 1.7 |
| 3.3 | 2012 | J | | | 1.7 |
| 3.3 | | F | | | 1.0 |
| 3.3 | | M | 3 | 0.2 | |
| 3.3 | | A | 3 | 0.6 | |
| 3.3 | | M | 3 | 0.3 | |
| 3.3 | | J | 3 | 1.1 | |
| 3.3 | | J | | | 0.5 |
| 3.3 | | A | | | 0.2 |
| 3.3 | | S | | | 0.5 |
| 3.3 | | O | | | 1.2 |
| 3.3 | | N | | | 2.2 |
| 3.3 | | D | | | 3.0 |
| 3.3 | 2013 | J | | | 1.7 |
| 3.3 | | F | | | 0.8 |
| 3.3 | | M | 3 | 0.6 | |
| 3.3 | | A | 3 | 0.4 | |
| 3.3 | | M | 3 | 0.6 | |
| 3.3 | | J | 3 | 0.4 | |
| 3.3 | | J | | | 0.4 |
| 3.3 | | A | | | 0.6 |
| 3.3 | | S | | | 2.9 |

| | | | | | |
|-----|------|---|---|-----|-----|
| 3.3 | | O | | | 4.7 |
| 3.3 | | N | | | 4.2 |
| 3.3 | | D | | | 2.3 |
| 3.3 | 2014 | J | | | 2.6 |
| 3.3 | | F | | | 0.8 |
| 3.3 | | M | 3 | 0.5 | |
| 3.3 | | A | 3 | 0.9 | |
| 3.3 | | M | 3 | 0.3 | |
| 3.3 | | J | 3 | 0.2 | |
| 3.3 | | J | | | 0.2 |
| 3.3 | | A | | | 1.0 |
| 3.3 | | S | | | 2.7 |
| 3.3 | | O | | | 4.5 |
| 3.3 | | N | | | 3.3 |
| 3.3 | | D | | | 2.3 |
| 3.3 | 2015 | J | | | 3.0 |
| 3.3 | | F | | | 3.3 |
| 3.3 | | M | 3 | 1.9 | |
| 3.3 | | A | 3 | 1.7 | |
| 3.3 | | M | 3 | 0.9 | |
| 3.3 | | J | 3 | 1.0 | |
| 3.3 | | J | | | 0.5 |
| 3.3 | | A | | | 0.5 |
| 3.3 | | S | | | 0.5 |
| 3.3 | | O | | | 1.1 |
| 3.3 | | N | | | 1.3 |
| 3.3 | | D | | | 1.2 |
| 3.3 | 2016 | J | | | 1.9 |
| 3.3 | | F | | | 1.9 |
| 3.3 | | M | 3 | 0.8 | |
| 3.3 | | A | 3 | 0.6 | |
| 3.3 | | M | 3 | 0.3 | |
| 3.3 | | J | 3 | 0.2 | |
| 3.3 | | J | | | 0.3 |
| 3.3 | | A | | | 0.8 |
| 3.3 | | S | | | 1.0 |
| 3.3 | | O | | | 1.0 |
| 3.3 | | N | | | 1.8 |
| 3.3 | | D | | | 2.4 |
| 3.3 | 2017 | J | | | 3.4 |
| 3.3 | | F | | | 1.0 |
| 3.3 | | M | 3 | 0.3 | |
| 3.3 | | A | 3 | 0.2 | |
| 3.3 | | M | 3 | 0.2 | |
| 3.3 | | J | 3 | 0.3 | |
| 3.3 | | J | | | 0.4 |
| 3.3 | | A | | | 0.5 |

| 3.3 | | S | | | 1.1 |
|----------------------------|-------|-------|----------------------|--|--|
| 3.3 | | O | | | 0.9 |
| 3.3 | | N | | | 1.4 |
| 3.3 | | D | | | 1.1 |
| 3.3 | 2018 | J | | | 0.9 |
| 3.3 | | F | | | 0.8 |
| 3.3 | | M | 3 | 0.3 | |
| 3.3 | | A | 3 | 0.3 | |
| 3.3 | | M | 3 | 0.3 | |
| 3.3 | | J | 3 | 0.2 | |
| 3.3 | | J | | | 0.2 |
| 3.3 | | A | | | 0.2 |
| 3.3 | | S | | | 0.4 |
| 3.3 | | O | | | 0.5 |
| 3.3 | | N | | | 0.5 |
| 3.3 | | D | | | 0.6 |
| 3.3 | 2019 | J | | | 0.7 |
| 3.3 | | F | | | 0.6 |
| 3.3 | | M | 3 | 0.6 | |
| 3.3 | | A | 3 | | |
| 3.3 | | M | 3 | | |
| 3.3 | | J | 3 | | |
| 3.3 | | J | | | |
| 3.3 | | A | | | |
| 3.3 | | S | | | |
| 3.3 | | O | | | |
| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |

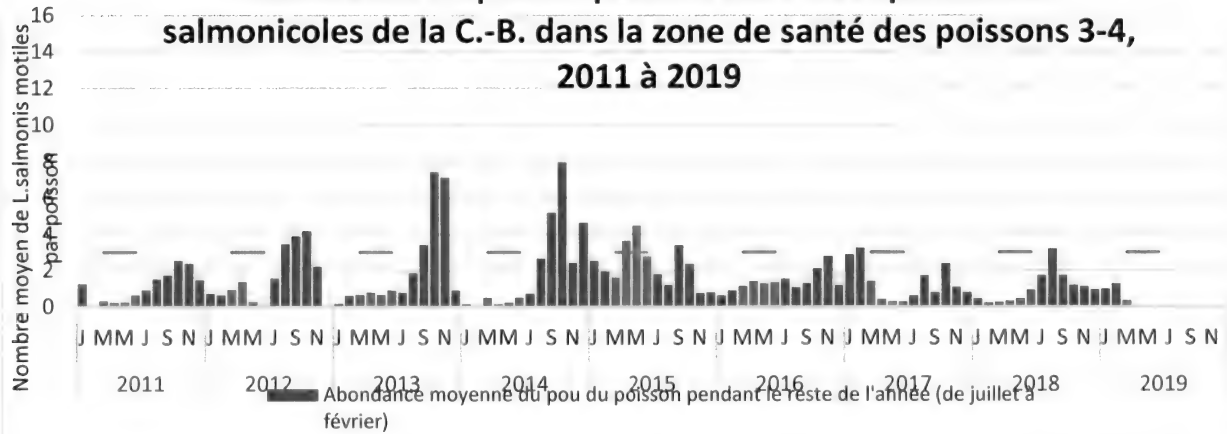


| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 3.4 | 2011 | J | | | 1.3 |
| 3.4 | | F | | | 0.0 |
| 3.4 | | M | 3 | 0.3 | |
| 3.4 | | A | 3 | 0.2 | |
| 3.4 | | M | 3 | 0.3 | |
| 3.4 | | J | 3 | 0.6 | |
| 3.4 | | J | | | 0.9 |
| 3.4 | | A | | | 1.5 |
| 3.4 | | S | | | 1.7 |
| 3.4 | | O | | | 2.5 |
| 3.4 | | N | | | 2.4 |
| 3.4 | | D | | | 1.5 |
| 3.4 | 2012 | J | | | 0.7 |
| 3.4 | | F | | | 0.6 |
| 3.4 | | M | 3 | 0.9 | |
| 3.4 | | A | 3 | 1.4 | |
| 3.4 | | M | 3 | 0.3 | |
| 3.4 | | J | 3 | | |
| 3.4 | | J | | | 1.6 |
| 3.4 | | A | | | 3.5 |
| 3.4 | | S | | | 3.9 |
| 3.4 | | O | | | 4.2 |
| 3.4 | | N | | | 2.2 |
| 3.4 | | D | | | 0.1 |
| 3.4 | 2013 | J | | | 0.2 |
| 3.4 | | F | | | 0.6 |
| 3.4 | | M | 3 | 0.7 | |
| 3.4 | | A | 3 | 0.8 | |
| 3.4 | | M | 3 | 0.7 | |
| 3.4 | | J | 3 | 0.9 | |
| 3.4 | | J | | | 0.8 |
| 3.4 | | A | | | 1.9 |
| 3.4 | | S | | | 3.4 |

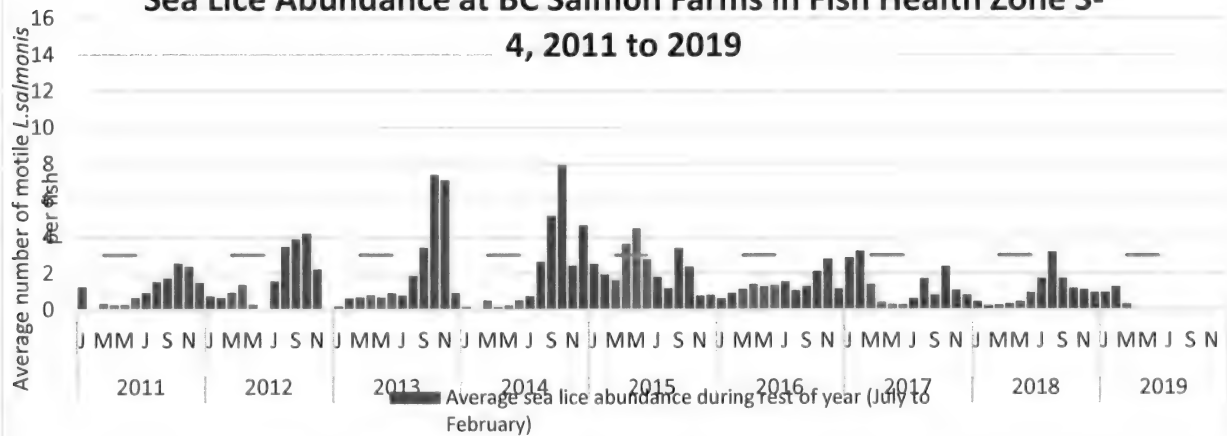
| | | | | | |
|-----|------|---|---|-----|-----|
| 3.4 | | O | | | 7.4 |
| 3.4 | | N | | | 7.1 |
| 3.4 | | D | | | 0.9 |
| 3.4 | 2014 | J | | | 0.2 |
| 3.4 | | F | | | 0.0 |
| 3.4 | | M | 3 | 0.5 | |
| 3.4 | | A | 3 | 0.1 | |
| 3.4 | | M | 3 | 0.2 | |
| 3.4 | | J | 3 | 0.5 | |
| 3.4 | | J | | | 0.7 |
| 3.4 | | A | | | 2.7 |
| 3.4 | | S | | | 5.2 |
| 3.4 | | O | | | 7.9 |
| 3.4 | | N | | | 2.4 |
| 3.4 | | D | | | 4.6 |
| 3.4 | 2015 | J | | | 2.5 |
| 3.4 | | F | | | 2.0 |
| 3.4 | | M | 3 | 1.6 | |
| 3.4 | | A | 3 | 3.6 | |
| 3.4 | | M | 3 | 4.5 | |
| 3.4 | | J | 3 | 2.8 | |
| 3.4 | | J | | | 1.8 |
| 3.4 | | A | | | 1.2 |
| 3.4 | | S | | | 3.4 |
| 3.4 | | O | | | 2.4 |
| 3.4 | | N | | | 0.8 |
| 3.4 | | D | | | 0.8 |
| 3.4 | 2016 | J | | | 0.6 |
| 3.4 | | F | | | 0.9 |
| 3.4 | | M | 3 | 1.2 | |
| 3.4 | | A | 3 | 1.4 | |
| 3.4 | | M | 3 | 1.3 | |
| 3.4 | | J | 3 | 1.4 | |
| 3.4 | | J | | | 1.5 |
| 3.4 | | A | | | 1.1 |
| 3.4 | | S | | | 1.3 |
| 3.4 | | O | | | 2.1 |
| 3.4 | | N | | | 2.8 |
| 3.4 | | D | | | 1.2 |
| 3.4 | 2017 | J | | | 2.9 |
| 3.4 | | F | | | 3.2 |
| 3.4 | | M | 3 | 1.4 | |
| 3.4 | | A | 3 | 0.4 | |
| 3.4 | | M | 3 | 0.3 | |
| 3.4 | | J | 3 | 0.3 | |
| 3.4 | | J | | | 0.6 |
| 3.4 | | A | | | 1.7 |

| | | | | | |
|-----|------|---|---|-----|-----|
| 3.4 | | S | | | 0.8 |
| 3.4 | | O | | | 2.4 |
| 3.4 | | N | | | 1.1 |
| 3.4 | | D | | | 0.8 |
| 3.4 | 2018 | J | | | 0.4 |
| 3.4 | | F | | | 0.2 |
| 3.4 | | M | 3 | 0.3 | |
| 3.4 | | A | 3 | 0.3 | |
| 3.4 | | M | 3 | 0.4 | |
| 3.4 | | J | 3 | 0.9 | |
| 3.4 | | J | | | 1.7 |
| 3.4 | | A | | | 3.2 |
| 3.4 | | S | | | 1.8 |
| 3.4 | | O | | | 1.2 |
| 3.4 | | N | | | 1.1 |
| 3.4 | | D | | | 0.9 |
| 3.4 | 2019 | J | | | 1.0 |
| 3.4 | | F | | | 1.3 |
| 3.4 | | M | 3 | 0.3 | |
| 3.4 | | A | 3 | | |
| 3.4 | | M | 3 | | |
| 3.4 | | J | 3 | | |
| 3.4 | | J | | | |
| 3.4 | | A | | | |
| 3.4 | | S | | | |
| 3.4 | | O | | | |
| 3.4 | | N | | | |
| 3.4 | | D | | | |

Abondance du pou du poisson dans les exploitations salmonicoles de la C.-B. dans la zone de santé des poissons 3-4, 2011 à 2019



Sea Lice Abundance at BC Salmon Farms in Fish Health Zone 3-4, 2011 to 2019

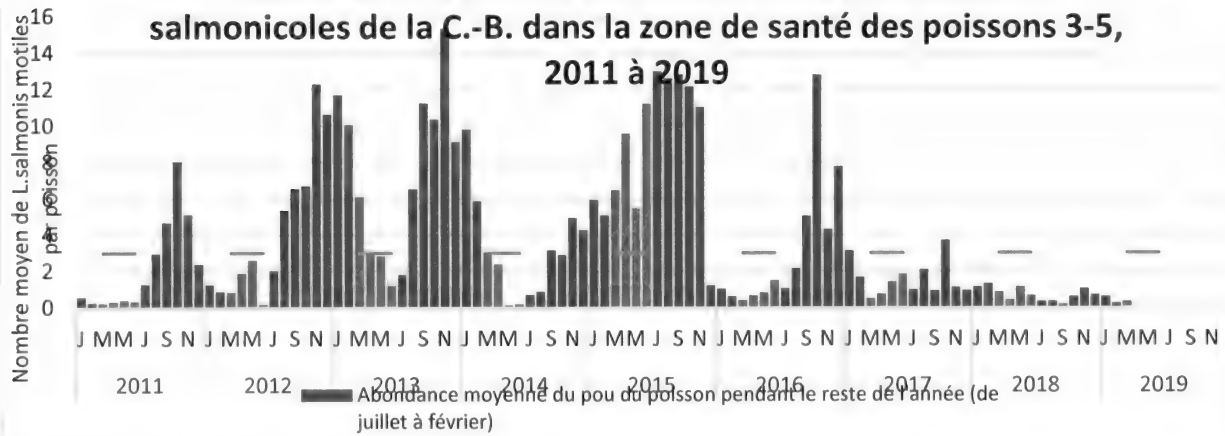


| Zone de santé des poissons | Année | Mois | Seuil de gestion | Abondance moyenne du pou du poisson pendant la période de dévalaison du saumon sauvage (mars à juin) | Abondance moyenne du pou du poisson pendant le reste de l'année (de juillet à février) |
|----------------------------|-------|-------|----------------------|--|--|
| Fish Health Zone | Year | Month | Management Threshold | Average sea lice abundance during wild salmon outmigration period (March to June) | Average sea lice abundance during rest of year (July to February) |
| 3.5 | 2011 | J | | | 0.6 |
| 3.5 | | F | | | 0.3 |
| 3.5 | | M | 3 | 0.2 | |
| 3.5 | | A | 3 | 0.3 | |
| 3.5 | | M | 3 | 0.4 | |
| 3.5 | | J | 3 | 0.3 | |
| 3.5 | | J | | | 1.3 |
| 3.5 | | A | | | 3.0 |
| 3.5 | | S | | | 4.7 |
| 3.5 | | O | | | 8.0 |
| 3.5 | | N | | | 5.1 |
| 3.5 | | D | | | 2.4 |
| 3.5 | 2012 | J | | | 1.3 |
| 3.5 | | F | | | 0.9 |
| 3.5 | | M | 3 | 0.9 | |
| 3.5 | | A | 3 | 1.9 | |
| 3.5 | | M | 3 | 2.6 | |
| 3.5 | | J | 3 | 0.2 | |
| 3.5 | | J | | | 2.1 |
| 3.5 | | A | | | 5.4 |
| 3.5 | | S | | | 6.6 |
| 3.5 | | O | | | 6.7 |
| 3.5 | | N | | | 12.3 |
| 3.5 | | D | | | 10.7 |
| 3.5 | 2013 | J | | | 11.7 |
| 3.5 | | F | | | 10.1 |
| 3.5 | | M | 3 | 6.1 | |
| 3.5 | | A | 3 | 3.0 | |
| 3.5 | | M | 3 | 2.8 | |
| 3.5 | | J | 3 | 1.2 | |
| 3.5 | | J | | | 1.8 |
| 3.5 | | A | | | 6.5 |
| 3.5 | | S | | | 11.2 |

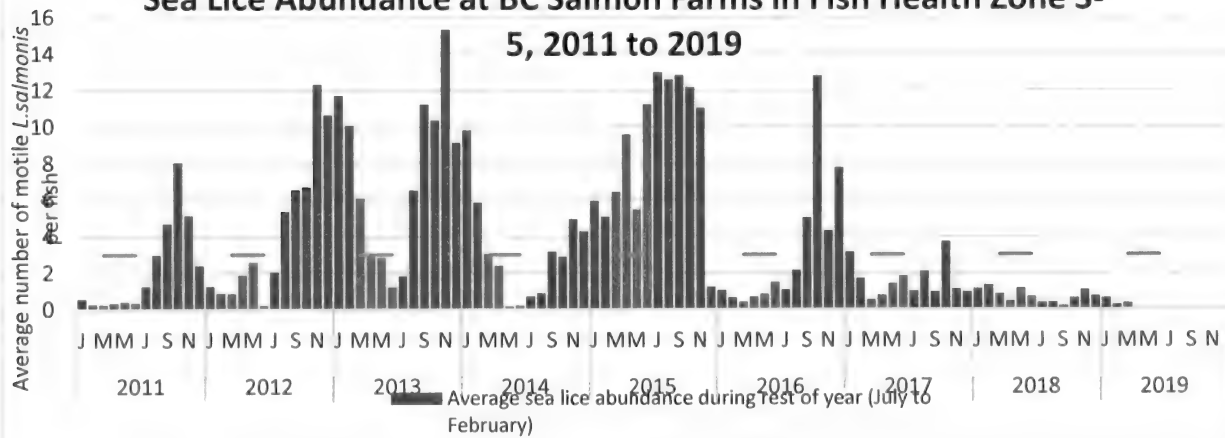
| | | | | | |
|-----|------|---|---|------|------|
| 3.5 | | O | | | 10.4 |
| 3.5 | | N | | | 15.3 |
| 3.5 | | D | | | 9.1 |
| 3.5 | 2014 | J | | | 9.8 |
| 3.5 | | F | | | 5.9 |
| 3.5 | | M | 3 | 3.1 | |
| 3.5 | | A | 3 | 2.4 | |
| 3.5 | | M | 3 | 0.1 | |
| 3.5 | | J | 3 | 0.2 | |
| 3.5 | | J | | | 0.7 |
| 3.5 | | A | | | 0.9 |
| 3.5 | | S | | | 3.2 |
| 3.5 | | O | | | 2.9 |
| 3.5 | | N | | | 4.9 |
| 3.5 | | D | | | 4.3 |
| 3.5 | 2015 | J | | | 5.9 |
| 3.5 | | F | | | 5.1 |
| 3.5 | | M | 3 | 6.5 | |
| 3.5 | | A | 3 | 9.6 | |
| 3.5 | | M | 3 | 5.5 | |
| 3.5 | | J | 3 | 11.2 | |
| 3.5 | | J | | | 13.0 |
| 3.5 | | A | | | 12.6 |
| 3.5 | | S | | | 12.8 |
| 3.5 | | O | | | 12.2 |
| 3.5 | | N | | | 11.0 |
| 3.5 | | D | | | 1.2 |
| 3.5 | 2016 | J | | | 1.0 |
| 3.5 | | F | | | 0.6 |
| 3.5 | | M | 3 | 0.4 | |
| 3.5 | | A | 3 | 0.7 | |
| 3.5 | | M | 3 | 0.8 | |
| 3.5 | | J | 3 | 1.5 | |
| 3.5 | | J | | | 1.1 |
| 3.5 | | A | | | 2.2 |
| 3.5 | | S | | | 5.0 |
| 3.5 | | O | | | 12.8 |
| 3.5 | | N | | | 4.3 |
| 3.5 | | D | | | 7.8 |
| 3.5 | 2017 | J | | | 3.1 |
| 3.5 | | F | | | 1.7 |
| 3.5 | | M | 3 | 0.5 | |
| 3.5 | | A | 3 | 0.8 | |
| 3.5 | | M | 3 | 1.4 | |
| 3.5 | | J | 3 | 1.8 | |
| 3.5 | | J | | | 1.0 |
| 3.5 | | A | | | 2.1 |

| | | | | | |
|-----|------|---|---|-----|-----|
| 3.5 | | S | | | 1.0 |
| 3.5 | | O | | | 3.7 |
| 3.5 | | N | | | 1.1 |
| 3.5 | | D | | | 1.0 |
| 3.5 | 2018 | J | | | 1.1 |
| 3.5 | | F | | | 1.3 |
| 3.5 | | M | 3 | 0.9 | |
| 3.5 | | A | 3 | 0.4 | |
| 3.5 | | M | 3 | 1.2 | |
| 3.5 | | J | 3 | 0.7 | |
| 3.5 | | J | | | 0.3 |
| 3.5 | | A | | | 0.4 |
| 3.5 | | S | | | 0.2 |
| 3.5 | | O | | | 0.6 |
| 3.5 | | N | | | 1.1 |
| 3.5 | | D | | | 0.7 |
| 3.5 | 2019 | J | | | 0.6 |
| 3.5 | | F | | | 0.2 |
| 3.5 | | M | 3 | 0.3 | |
| 3.5 | | A | 3 | | |
| 3.5 | | M | 3 | | |
| 3.5 | | J | 3 | | |
| 3.5 | | J | | | |
| 3.5 | | A | | | |
| 3.5 | | S | | | |
| 3.5 | | O | | | |
| 3.5 | | N | | | |
| 3.5 | | D | | | |

Abondance du pou du poisson dans les exploitations salmonicoles de la C.-B. dans la zone de santé des poissons 3-5, 2011 à 2019



Sea Lice Abundance at BC Salmon Farms in Fish Health Zone 3-5, 2011 to 2019



Wilkinson, Davida

From: Sandberg, Krista
Sent: Wednesday, May 29, 2019 2:59 PM
To: Paylor, Adrienne
Subject: FW: April sea lice report ready for your review

April sea lice for your review. See link below. Sarah's note about Cermaq's reporting is referring to a couple sites that were potentially not sampling as required. Sir Ed had a Slice treatment that began on 10-Apr but did not report any sampling prior to the treatment. Ross only sampled 2 pens of fish, possibly due to decreased inventory due to harvest. We did have some conversations with Cermaq [REDACTED] and she was not providing the level of detail that we would normally expect to see in the monthly sea lice report.

Cheers,
Krista.

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: McConnachie, Sarah
Sent: May-29-19 2:18 PM
To: Sandberg, Krista
Subject: RE: April sea lice report ready for your review

Krista,

April is approved but we will make note of the following:

- Assess Cermaq's May report to confirm issues are resolved regarding expected reporting details

Dr. Sarah McConnachie MSc, PhD, DVM

Field Operations Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Aquaculture Environmental Operations - Fish Health
Courtenay, British Columbia
Telephone | Téléphone: 250-703-0929
Cell Phone | Cellulaire: [REDACTED]
Fax | Télécopieur: 250-703-0921
Sarah.McConnachie@dfo-mpo.gc.ca

s.16(2)(c)

s.19(1)



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From: Sandberg, Krista
Sent: May-27-19 12:55 PM

To: McConnachie, Sarah

Subject: April sea lice report ready for your review

Hi Sarah,

The April sea lice report is complete and ready for your review. Let me know if you want to discuss it over the phone or anything. Given all the craziness around sea lice right now, I think it would be good to post this one as soon as possible.

There are a few highlights in yellow and orange for your review.

Cheers,

Krista.

\\Dcbsvanna01b\VAN_RHQ_4\Aqua\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2019\2019 Farm Level
Sea Lice Summary.xlsx

Krista Sandberg

Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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Canada

s.16(2)(c)

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| Facility Reference Number | Licence Holder | Site Common Name | Latitude | Longitude | Fish Health Zone | Management Zone | Number of Counts Performed | monthly farm abundance motile | monthly farm abundance females | monthly farm abundance chalcimus | monthly farm abundance Caligus | English Comments | French Comments | year class | entry date | age | Internal Comments |
|---------------------------|----------------|------------------|----------|-----------|------------------|-----------------|----------------------------|-------------------------------|--------------------------------|----------------------------------|--------------------------------|---------------------------------|--|------------|------------|-----|---|
| 1537 | Armaq Cana | Bare Bluff | 49.32702 | -125.799 | 2.3 | Clayoquot | 0 | | | | | Fallow | Mise en jachère | | | | |
| 227 | Armaq Cana | Bawden | 49.30798 | -126.0072 | 2.3 | Clayoquot | 1 | 0.01 | 0.01 | 0.02 | 0.01 | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | | | single count due to recent transfer |
| 520 | Armaq Cana | Bedwell | 49.26548 | -125.8125 | 2.3 | Clayoquot | 2 | 15.89 | 6.89 | 1.84 | 0.03 | Harvesting | Récolte | 2 | | | EXCEEDED 2-Apr (15.37), 17-Apr (16.41); Harvesting - expected to be empty by end of May |
| 1148 | Armaq Cana | Binns Island | 49.34182 | -125.9533 | 2.3 | Clayoquot | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (< 4 bassins) | 1 | | | |

s.20(1)(b)

| | | | | | | | | | | | | | | | | |
|------|------------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|---|---|
| 1144 | Armaq Cana | Burdwood | 50.7969 | -126.4958 | 3.3 | Broughton | 1 | 0.38 | 0.13 | 0.00 | 0.12 | Count(s) not required (<21 days post in-feed treatment) | Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 2 |  | SLICE 4-Apr, single count of 2 pens on 27/28 Apr; single pen 2-Apr moved to March |
| 819 | Armaq Cana | Cecil Island | 50.85123 | -126.715 | 3.3 | Broughton | 0 | | | | | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | Medicated feed started 22-Mar |

s.20(1)(b)

| | | | | | | | | | | | | | | | | | |
|-----|----------------------|-----------|-----------|-----------|-----------|-----------|------|------|------|------|---|--|-------|---|--|--|--|
| 458 | Armaq Canapress Harb | 50.83772 | -126.6631 | 3.3 | Broughton | 2 | 0.77 | 0.43 | 0.09 | 0.36 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | Brood | | | | 2 counts of 2 pens; medicated feed started 11-Apr |
| 234 | Armaq Cana | Dixon Bay | 49.40478 | -126.1507 | 2.3 | Clayoquot | 2 | 0.26 | 0.02 | 2.00 | 0.56 | | | 1 | | | single pen 25-Apr not included, single pen 27-Mar moved to April |

s.20(1)(b)

| | | | | | | | | | | | | | | | | | | | |
|------|-------------|----------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--|--|
| 869 | Armaq Canal | Arnaud Island | 50.85271 | -126.7574 | 3.3 | Broughton | 2 | 0.51 | 0.12 | 0.52 | 2.11 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | | single pen 1-Apr moved to March; single pen 2-May moved to April |
| 1507 | Armaq Canal | Willar Channel | 49.37622 | -126.09 | 2.3 | Clayoquot | 2 | 0.13 | 0.01 | 3.07 | 3.51 | | | 1 | | | | | single pen 1-Apr moved to March |

s.20(1)(b)

| | | | | | | | | | | | | | | | | | | |
|------|------------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|---|---|---|--|--|--|--|
| 543 | Armaq Cana | Mussel Rock | 49.25925 | -125.8676 | 2.3 | Clayoquot | 1 | 0.00 | 0.00 | 0.00 | 0.10 | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | | | single pens Apr 9,23,27 - all very low so kept as single count; second count not performed due to meds - approve SMI |
| 6668 | Armaq Cana | Plover Point | 49.21433 | -125.7669 | 2.3 | Clayoquot | 3 | 1.78 | 1.41 | 0.24 | 0.07 | | | 2 | | | | |
| 304 | Armaq Cana | Raza Island | 50.32159 | -125.0088 | 3.2 | Discovery | 2 | 1.33 | 0.78 | 0.29 | 0.16 | | | 2 | | | | |

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| | | | | | | | | | | | | | | | | | | |
|-----|------------|-----------|----------|-----------|-----|-----------|---|------|------|------|------|--|--|---|--|--|--|---|
| 314 | Armaq Cana | Ross Pass | 49.32437 | -126.0485 | 2.3 | Clayoquot | 2 | 0.05 | 0.02 | 0.06 | 0.03 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirements | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 2 counts of 2 pens - not sure why they didn't count 3 full pens |
|-----|------------|-----------|----------|-----------|-----|-----------|---|------|------|------|------|--|--|---|--|--|--|---|

s.20(1)(b)

| | | | | | | | | | | | | | | | | | | |
|------|-------------------------|----------|-----------|-----|-----------|---|------|------|------|------|--|---|---|---|--|--|--|---|
| 527 | Armaq Canabranac Island | 49.24803 | -125.9067 | 2.3 | Clayoquot | 0 | | | | | | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | | | Data not reporting in initial submission. Maria followed up and they resubmitted saying that they were medicating these fish for mouthrot |
| 1336 | Armaq Canabranac Island | 50.87791 | -126.9015 | 3.3 | Broughton | 1 | 0.38 | 0.08 | 2.51 | 0.28 | | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | | | single pen 2-Apr not included; medicated feed starting 22-Apr, single count - could have still done 2 counts? |

s.20(1)(b)

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|------|------------|------------|----------|-----------|-----|-------------|---|------|------|------|------|--|---|--|---|--|--|--|--|
| 728 | Armaq Cana | Edmund B | 50.83096 | -126.5968 | 3.3 | Broughton | 0 | | | | | | Count(s) not required (<21 days post in-feed treatment) | Dénombrement(s) non requis (<21 jours après le traitement dans l'alimentation) | 2 | | | | Slice 10-Apr. Seems like they could have done a count at the beginning of the month? |
| 1698 | eg Seafood | Ahlstrom | 49.7793 | -124.154 | 3.1 | Insight Coa | 0 | | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | | |
| 871 | eg Seafood | Barnes Bay | 50.32437 | -125.2604 | 3.2 | Discovery | 0 | | | | | | Fallow | Mise en jachère | | | | | |
| 1789 | eg Seafood | Concepcion | 49.65923 | -126.4759 | 2.4 | Nootka | 2 | 0.11 | 0.04 | 0.07 | 0.12 | | | | 1 | | | | |
| 1697 | eg Seafood | Culloden | 49.79595 | -124.1016 | 3.1 | Insight Coa | 2 | 0.47 | 0.04 | 0.24 | 0.03 | | | | 1 | | | | |
| 1863 | eg Seafood | Esperanza | 49.87814 | -126.7615 | 2.4 | Esperanza | 2 | 2.60 | 1.30 | 0.37 | 0.00 | | Medicinal bath treatment | Traitement médicamenteux dans un bain | 2 | | | | 1st count post H2O2 (10 pens) (0.55); 2nd count 11 days later EXCEEDED (4.65) |
| 1762 | eg Seafood | Gore | 49.6466 | -126.4317 | 2.4 | Nootka | 2 | 0.10 | 0.03 | 0.08 | 0.02 | | | | 1 | | | | |

s.20(1)(b)

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|------|------------|--------------|----------|-----------|-----|-------------|---|------|------|------|------|------------|---------|---|--|--|--|
| 1862 | eg Seafood | Hecate | 49.86799 | -126.7573 | 2.4 | Esperanza | 2 | 4.13 | 2.16 | 0.06 | 0.05 | Harvesting | Récolte | 2 | | | EXCEEDED 21-Apr (6.63); Harvesting - plan to be empty by end of May |
| 1849 | eg Seafood | Juchalat Noi | 49.64394 | -126.3395 | 2.4 | Nootka | 3 | 0.07 | 0.03 | 0.00 | 0.00 | | | 1 | | | |
| 1825 | eg Seafood | Noo-la | 50.60799 | -126.363 | 3.3 | Broughton | 2 | 1.93 | 0.81 | 0.66 | 0.90 | | | 2 | | | single pen 9-Apr not included |
| 332 | eg Seafood | Salten | 49.61535 | -123.8341 | 3.1 | Unshine Coa | 2 | 0.02 | 0.00 | 0.07 | 0.00 | | | 1 | | | |

Best available copy

s.20(1)(b)

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|-----|------------|---------|---------|-----------|-----|--------------|---|------|------|------|------|---|--|---|--|--|--|--------------------|
| 746 | eg Seafood | Site 13 | 49,6291 | -123,8427 | 3.1 | sunshine Coa | 2 | 0.01 | 0.00 | 0.25 | 0.04 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 2 counts of 2 pens |
|-----|------------|---------|---------|-----------|-----|--------------|---|------|------|------|------|---|--|---|--|--|--|--------------------|

s.20(1)(b)


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|------|------------|---------|---------|-----------|-----|-----------|---|------|------|------|------|--|---|--|--|--|--|--|
| 1079 | eg Seafood | Steamer | 49.8868 | -126.7911 | 2.4 | Esperanza | 2 | 4.17 | 1.38 | 1.28 | 0.02 | | 2 | | | | | EXCEEDED 25-Apr (7.55); no managem ent action identified in monthly report - plan to start harvesting in May and be empty by August |
|------|------------|---------|---------|-----------|-----|-----------|---|------|------|------|------|--|---|--|--|--|--|--|

Best available copy

s.20(1)(b)

| 7273 | eg Seafood | Tsa-ya | 50.61225 | -126.3321 | 3.3 | Broughton | 2 | 0.96 | 0.26 | 1.33 | 0.70 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 1st count 6 pens (3 pens 13-Apr, 3 pens 16-Apr) |
|------|------------|------------|----------|-----------|-----|---------------|---|------|------|------|------|---|--|---|--|--|--|---|
| 221 | eg Seafood | Vantage | 49.67226 | -123.8602 | 3.1 | Unshine Coast | 2 | 0.05 | 0.00 | 0.70 | 0.00 | | | 1 | | | | |
| 1839 | eg Seafood | Wa-kwa | 50.60106 | -126.3474 | 3.3 | Broughton | 2 | 0.39 | 0.09 | 0.25 | 0.54 | | | 1 | | | | |
| 1705 | eg Seafood | Williamson | 49.65623 | -126.4285 | 2.4 | Nootka | 2 | 0.03 | 0.00 | 0.06 | 0.00 | | | 1 | | | | |
| 7714 | eg Harvest | Alexander | 52.67648 | -128.5749 | 3.5 | Central Coast | 3 | 0.51 | 0.04 | 3.48 | 0.73 | | | 1 | | | | |


s.20(1)(b)

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|------|-------------|-------------|----------|-----------|-----|------------|---|------|------|------|------|--|---|---|-------|---|--|
| 1300 | e Harvest C | Althorpe | 50.47531 | -125.8098 | 3.2 | Discovery | 4 | 0.36 | 0.18 | 0.00 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirements | La méthode d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | ##### |  | single pen 1-Apr not included (post-Slice); 4 counts, 1st 3rd 2 pens |
| 892 | e Harvest C | Bell Island | 50.83242 | -127.5206 | 3.4 | Port Hardy | 5 | 0.88 | 0.19 | 0.44 | 0.15 | | | 1 | | | |

s.20(1)(b)

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|------|-------------|-----------|----------|-----------|-----|---------------|---|------|------|------|------|---|---|---|--|--|--|--------------------------|
| 790 | e Harvest C | Harvest C | 50.41723 | -125.6628 | 3.2 | Discovery | 5 | 0.48 | 0.19 | 1.21 | 0.10 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthode d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 5 counts, 2nd 4th 2 pens |
| 7713 | e Harvest C | Cougar | 52.71993 | -128.5743 | 3.5 | Central Coast | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | | |

s.20(1)(b)

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|------|-----------------------|----------|-----------|-----|------------|---|------|------|------|------|--|--|---|-------|---|--------------------------|
| 1586 | Harvest Doctor Islet | 50.65373 | -126.2893 | 3.3 | Broughton | 6 | 0.14 | 0.04 | 0.16 | 0.18 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirements | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | ##### |  | 6 counts, 3rd 5th 2 pens |
| 1288 | Harvest Doctor Island | 50.81456 | -127.487 | 3.4 | Port Hardy | 4 | 0.23 | 0.09 | 0.03 | 0.02 | | | 2 | | | |
| 1293 | Harvest Duncan Islet | 50.8195 | -127.5557 | 3.4 | Port Hardy | 4 | 0.06 | 0.03 | 0.00 | 0.01 | | | 2 | | | |

s.20(1)(b)

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|------|--------------|--------------|----------|-----------|-----|----------------|---|------|------|------|------|--|--|-------|--|--|-------------------------------------|
| 7053 | le Harvest C | Ghi ya | 50.90078 | -127.9364 | 3.4 | Port Hardy | 4 | 0.40 | 0.09 | 0.21 | 0.01 | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 4 counts, 1st 2nd 4th 2 pens |
| 303 | le Harvest C | Glacial Cree | 50.01008 | -123.9024 | 3.1 | sunshine Coast | 1 | 0.17 | 0.00 | 0.00 | 0.32 | Count(s) not required (broodstock in spawning year) | Dénombrement(s) non requis (Géniteurs à l'année du frai) | Brood | | | single count due to stress on brood |

s.20(1)(b)

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|------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|--|---|---|--|--|---|
| 1581 | Harvest Date | 50.41339 | -125.7697 | 3.2 | Discovery | 1 | 1.10 | 0.45 | 0.02 | 0.00 | In-feed Treatment | Traitement administré dans l'alimentation | 2 | | | EXCEEDED 5-Apr (4.27); SLICE 8-Apr, pre/post treatment counts |
| 1581 | Harvest Date | 50.41339 | -125.7697 | 3.2 | Discovery | 1 | 4.27 | 2.15 | 2.07 | 1.85 | Management planned (In-feed treatment) | Mesure de gestion planifiée (Traitement administré dans l'alimentation) | 2 | | | |

Best available copy

s.20(1)(b)

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|------|----------------------|----------|-----------|-----|-----------|---|------|------|------|------|------|--|--|---|--|--|--|---------------------|
| 1618 | e Harvest Cimphey Rd | 50.69682 | -126.2553 | 3.3 | Broughton | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirements | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 1st count 2 pens |
|------|----------------------|----------|-----------|-----|-----------|---|------|------|------|------|------|--|--|---|--|--|--|---------------------|

s.20(1)(b)

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|------|--------------|---------|----------|-----------|-----|---------------|---|------|------|------|------|---|---|---|--|--|--|----------------------|
| 1691 | le Harvest C | Kid Bay | 52.80048 | -128.4011 | 3.5 | Central Coast | 5 | 0.58 | 0.30 | 0.55 | 0.42 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthode d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 5 counts, 2nd 2 pens |
| 144 | le Harvest C | Koskimo | 50.45861 | -127.8899 | 2.4 | Quatsino | 3 | 0.27 | 0.08 | 2.80 | 2.01 | | | 1 | | | | |

s.20(1)(b)

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|-----|-----------------------|----------|-----------|-----|-----------|---|------|------|------|------|---|---|---|--|--|--|---|
| 143 | Harvest Cansen Island | 50.60175 | -126.6328 | 3.3 | Broughton | 1 | 0.13 | 0.00 | 1.45 | 0.37 | Count(s) not performed (health management action) | Dénombrement(s) non effectué(s) (mesure de gestion de la santé) | 1 | | | | single count on 7-Apr, second count not performed due to mouthrot treatment - as per conversation with KS approved SM |
|-----|-----------------------|----------|-----------|-----|-----------|---|------|------|------|------|---|---|---|--|--|--|---|

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s.20(1)(b)

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|-----|-------------|----------|----------|-----------|-----|-----------|---|------|------|------|------|---|---|---|--|--|--|--------------------------|
| 100 | e Harvest C | Lees Bay | 50.41063 | -125.7003 | 3.2 | Discovery | 4 | 0.33 | 0.13 | 1.38 | 0.15 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthode d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 4 counts, 2nd 4th 2 pens |
|-----|-------------|----------|----------|-----------|-----|-----------|---|------|------|------|------|---|---|---|--|--|--|--------------------------|

s.20(1)(b)

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|------|-----------------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|
| 1238 | e Harvest Chahatta We | 50.469 | -127.8354 | 2.4 | Quatsino | 5 | 0.31 | 0.08 | 1.34 | 1.39 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 5 counts, 2nd 4th 2 pens |
| 467 | e Harvest QMidsummer | 50.65784 | -126.663 | 3.3 | Broughton | 0 | | | | | Count(s) not required (<4 pens) | Dénombrement(s) non requis (<4 bassins) | 1 | | | | smolt entry started |

s.20(1)(b)

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|------|-----------------------|----------|-----------|-----|----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|
| 1237 | e Harvest Clonday Rod | 50.48588 | -127.8758 | 2.4 | Quatsino | 4 | 0.44 | 0.13 | 2.08 | 2.39 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 4 counts, 2nd 4th 2 pens |
|------|-----------------------|----------|-----------|-----|----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|

s.20(1)(b)

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|----|-----------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|
| 78 | e Harvest | Phillips Arm | 50.48825 | -125.3566 | 3.2 | Discovery | 4 | 0.18 | 0.09 | 0.00 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 4 counts, 1st 3rd 2 pens |
|----|-----------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|

s.20(1)(b)

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|------|--------------------------|----------|-----------|-----|------------|---|------|------|------|------|---|--|---|--|--|--|--|
| 141 | e Harvest Cort Elizabeth | 50.67099 | -126.4765 | 3.3 | Broughton | 4 | 0.22 | 0.09 | 0.14 | 0.06 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 4 counts, 1st 3rd 2 pens; single pen 30-Apr not included |
| 1198 | e Harvest C Raynor | 50.89253 | -127.2536 | 3.4 | Port Hardy | 4 | 0.15 | 0.04 | 0.68 | 0.11 | | | 1 | | | | |
| 1382 | e Harvest C Robertson | 50.93155 | -127.4226 | 3.4 | Port Hardy | 3 | 0.13 | 0.09 | 0.00 | 0.00 | | | 2 | | | | |

s.20(1)(b)

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|------|-----------------------|----------|----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|
| 1059 | e Harvest Orgeaunt Pa | 50.67346 | -126.186 | 3.3 | Broughton | 4 | 0.09 | 0.02 | 0.46 | 0.19 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 1 | | | | 4 counts, 1st 3rd 2 pens |
|------|-----------------------|----------|----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|

s.20(1)(b)

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|------|--------------|-------------|----------|-----------|-----|------------|---|--|------|------|------|--|--|-------|--|--|--|---|
| 1136 | le Harvest C | Shaw Point | 50.48527 | -125.8898 | 3.2 | Discovery | 5 | | 1.88 | 2.26 | 0.45 | Management action planned (Non-medical bath treatment) | Mesure de gestion planifiée (Traitement non médical au bain) | Brood | | | | FW bath treatment 26-Apr. Did not include pre/post treatment counts because abundance did not drop below threshold and difficult to delineate - approve; some decrease seen by pen but not overall (SM) |
| 1350 | le Harvest C | Shelter Bay | 50.96555 | -127.4535 | 3.4 | Port Hardy | 0 | | | | | Fallow | Mise en jachère | | | | | |

s.20(1)(b)

Best available copy

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|-----|------------------------|----------|-----------|-----|------------|---|------|------|------|------|---|---|---|--|--|--|---|
| 831 | e Harvest Shelter Pass | 50.88414 | -127.5004 | 3.4 | Port Hardy | 4 | 2.68 | 1.10 | 1.50 | 0.46 | Management action planned (Medicinal bath treatment); Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement médicamenteux dans un bain); La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 4 counts, 2nd 5 pens, 4th 2 pens; H2O2 planned in May once grade harvesting is complete |
|-----|------------------------|----------|-----------|-----|------------|---|------|------|------|------|---|---|---|--|--|--|---|

s.20(1)(b)

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|-----|-----------|---------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|
| 380 | e Harvest | Clonora Point | 50.42362 | -125.3052 | 3.2 | Discovery | 3 | 0.27 | 0.14 | 0.04 | 0.06 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 3 counts, 1st 3rd 2 pens |
|-----|-----------|---------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|

s.20(1)(b)

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|-----|---------------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|
| 465 | e Harvest C Swanson | 50.61871 | -126.7047 | 3.3 | Broughton | 6 | 0.08 | 0.04 | 0.09 | 0.05 | Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | La méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 6 counts, 3rd 5th 2 pens |
|-----|---------------------|----------|-----------|-----|-----------|---|------|------|------|------|---|--|---|--|--|--|--------------------------|

s.20(1)(b)

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|-----|-----------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|--|--|---|--|--|--|--|
| 820 | e Harvest | Clacklow Poi | 50.78659 | -126.6915 | 3.3 | Broughton | 5 | 2.48 | 0.78 | 5.12 | 2.25 | Management action planned (In-feed treatment); Sampling methodology differs from requirements outlined in licence conditions, but meets or exceeds the requirement | Mesure de gestion planifiée (Traitement administré dans l'alimentation); Logie méthodologie d'échantillonnage diffère des exigences mentionnées dans les conditions de permis, mais répond aux exigences, les dépasse même | 2 | | | | 5 counts, 2nd 4th 2 pens; EXCEEDED 22-Apr (3.95), 30-Apr (3.12) NOT REPORTED ; Slice ordered for 4-May barge - Was sent to SM May 9th, forwarded on to AQFF May 29th by SM |
|-----|-----------|--------------|----------|-----------|-----|-----------|---|------|------|------|------|--|--|---|--|--|--|--|

s.20(1)(b)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Thursday, May 30, 2019 1:04 PM
To: Paylor, Adrienne
Cc: Webb, Allison; Patirana, Anoma
Subject: RE: Data team summary

My responses to your questions below ☺

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



Government
of Canada

Gouvernement
du Canada

Canada

From: Paylor, Adrienne
Sent: May-30-19 12:51 PM
To: Sandberg, Krista
Cc: Webb, Allison; Patirana, Anoma
Subject: FW: Data team summary

This is awesome Krista and thanks so much for taking the time to write it out for us. I know we have been talking about these needs and challenges for a number of years now so it is great to see it pulled together in place so we can have coordinated conversation going forward. I had a few quick questions in red below and other than that look forward to more conversations.

Thanks,
Adrienne

From: Sandberg, Krista
Sent: May-30-19 12:29 PM
To: Webb, Allison
Cc: Patirana, Anoma; Paylor, Adrienne
Subject: Data team summary

Hi Allison,

As you know, we have a lot of challenges keeping on top of our data management and are doing our best to keep things rolling. AMD collects a huge amount of industry and audit data, and all of this information needs to be well managed to ensure that we are communicating accurate information both internally and externally. I won't go into the exhaustive list of all the datasets that the data team manages, as I have provided this to you in the past and I don't think that the overwhelming list of reports accurately communicates the role of our data team or how we function and why. I think it would be best to provide you with a bit of context of where we were two years ago, where we are now, and what I see for the future.

I was assigned to work on the AQUIS project a few years ago, and around the same time began helping the Fish Health team with production of some of their public reports including mortality and sea lice reports. I did these tasks off the side of my desk while working on the benthic team, but it soon became apparent that we needed to spend a lot more effort on improving our data and public reporting processes. This was also identified in the audit of our public reporting

process which eventually led to my assignment to AP and ability to focus on the data team full time. This was a welcome relief as it was overwhelming to try to tackle such a huge task while also doing my substantive job. However, as things have improved, that has also created the need for us to “catch up” with implementation of these improvements so that we can work more efficiently. We have come so, so far with our development of the AQUIS database in the last year or so. It has gone from a basically useless system that was so full of errors that we couldn't hardly upload anything (and if we could, we weren't able to export it out again), to a system that is much more current and has the capacity for us to use it as a reporting and communication tool as well as a place to store our data in a secure place. While I'm not saying it's perfect, there are still a lot of bugs, it is now at a point where it is functional and beneficial, and getting better all the time.

As an example, we have developed several new modules for the tracking and storage of fish health information including fish health events, mortality events, and sea lice overabundance notifications. Prior to the development of these modules in AQUIS, this information was all tracked and stored in a very large and cumbersome Excel spreadsheet which is managed by Maria. The process was that when industry reported one of these events, they would send an email to the Fish Health inbox explaining the event. This might be in the form of an email alone, maybe some attached supporting documentation, sometimes a templated report, you get the idea – no structure. So, Maria would review the report, transcribe the data into a tracking spreadsheet, and save the random files on the network drive. If a request came in for information on the fish health event history in an area, for example, she would then go to the tracking spreadsheet, filter for the area or facility, then track down and summarize all the information. Now, with the new modules, we are able to store and summarize the information in a much more efficient and secure manner in AQUIS. We developed reporting templates that industry uses so the events are reported in a clear and consistent manner using drop downs for event descriptors so that DFO staff do not need to take the time to standardize the data coming in. The reporting templates are submitted to the Fish Health inbox and uploaded into AQUIS. This step is simple and puts the data into a format that we can then search and summarize easily. The data are also then safe from corruption or being lost on the network drive. On the public reporting side of things, we will now only need to do a simple export from AQUIS to produce a report rather than searching through files, and potentially missing or misreporting events. However, the problem is that these modules were only implemented in April, and we don't have the capacity to take the time to upload the historic data into AQUIS. We were hoping to start fresh with the 2019 reporting year and from that point forward, start with the new process to facilitate our public reporting but unfortunately Maria is already behind and unable to enter the 2019 quarter 1 data, not to mention the 2011-2018 events. Do you mean we are collecting data incoming faster than we can upload it into AQUIS? Partially yes, partially no. A lot of the problem is implementing the new process and the learning curve associated with that. We kind of end up doing both for a bit while people are getting used to the new process. From April on, Maria is able to keep up with all new incoming reports, but with all the additional time she's spending on AAR and helping the fish health team with some improvements that they've made to the way they collect audit data, she hasn't had the time to go back and enter the notifications from the first quarter. Part of the issue with creating these new processes is that you put a bit more effort in at the beginning but it pays off at the end.

Another example of a module that we have recently developed is a really awesome “Site Summary Report” that allows anybody in AMD to easily choose a facility and a time period and output a PDF report that contains all the site information, production, mortality, sea lice, audit data, etc. My vision for this report was that it could be used for the management team to get a snapshot of a facility's history, or for the fish health team to quickly export data prior to an audit. I'm sure you can imagine how amazing this could be, especially for situations like the Cyrus Rock incident from yesterday. Bernie was looking for information for a reporter on when the site was last active, and what the fish health and sea lice history was at the facility. This would be all included in nice graphs in the site summary report....IF the data were uploaded into AQUIS.

When we hired the casual to help us in the fall, he was able to compile a lot of the sea lice data and inventory data going back to as far as 2002, as well as help with upload of some incidental catch and AAR data among other smaller projects. Much of our historic data needs to be transferred into templates for upload, and in some cases needs to be “cleaned up” a bit so that it is consistent with current reporting standards so that everything is comparable and we can have a consistent time series. Sean also spent a significant portion of his time working with Shelley Jepps to upload all her

historic shellfish site visit data into AQUIS including pictures, site inspection checklists, compliance letters etc. This information is now all stored in the database so it's easy to determine when certain facilities were audited, how much effort was put into certain areas, etc. can we pull "awesome site summary reports" on shellfish now? We have a smaller scale site summary report for shellfish which I got the idea for the finfish report from. The shellfish report only has site and licensing information, not auditing information. The idea was that we would create the finfish report and if it was well received then we could adapt this to include other sectors. However, with the AQUIS development budget being cut this year, this is probably a ways off.

Sean spent about half of his time entering marine finfish data and the other half entering shellfish data. He also spent a couple weeks helping me with the AAR data upload into the National AAR database which was a huge help, and is being done by Maria this year since AJ has taken the new position and ARM doesn't have the capacity to help as they did in previous years. In addition, Angela has been helping to upload some of the inventory data that Sean did not get to. Sean was able to populate a lot of the templates but the database upgrade (AQUIS upgrade?) was a bit behind schedule so he didn't have time to complete the actual upload of these files. Ang has been a huge help and [REDACTED] having a different project to work on. I'm hoping to get her to help with a few other data tasks once she's finished with the inventory – she is only doing it for a couple hours here and there when she has time. We are constantly upgrading AQUIS! A couple years ago we were excited for Version 2.0 and now we are on 3.5 ☺ Every time we implement a new module or make enhancements or fixes, they release a new version. I should have also mentioned that a lot of these upgrades are with the intention of support for data sharing with national initiatives such as AAR reporting and future Barent's Watch-like reporting.

If we were to hire another casual for this year, I would like to see them focus on helping Maria to get the historic Fish Health Event data organized and uploaded. We are also still struggling a bit with finding somebody to upload all of the AAR annual reports, and there is very little historic benthic data in AQUIS at this time. We still have some outstanding marine finfish data that needs to be dealt with, and there are new reports coming in every month that need to be uploaded. I have a person in mind who is interested in working part time for the summer, [REDACTED]. She likely would not have time to use up her 90 days, but it would be a good start if you're not comfortable with committing to the full 90 day casual.

Looking to the future, I see the data team as being a huge necessity to AMD. I truly believe that if you have crappy data going in then there will be crappy advice going out. Now that it is becoming more common knowledge that we have a data and public reporting coordinator, I am getting more and more requests for information from coworkers, science colleagues, industry, etc. I am finding it challenging to keep up with all the reports coming in, doing the QA/QC on the data, following up with industry in the cases of discrepancies, uploading this information into the database, and creating and coordinating all the public reports and responding to data requests. This is a huge job, a majority of which is being done by myself and Maria, who is technically only supposed to be spending 50% of her time on data team related tasks. Many of these tasks could/should be done by a technician, but we don't have one, so we are forced to have higher level BI-02/03 people managing incoming reports and uploading data. The creation of all these new AQUIS modules has created a bit more work on the front end as we now have an extra step of uploading data, but will hopefully alleviate some of the effort on the analysis end. If we had a permanent technician on staff, even if it were part time, I am confident that we would effectively be able to provide our team with quality up to date information and better support people such as our epidemiologist. We would also be able to spend more time monitoring compliance and responding to issues in a more timely manner. We have great visions of creating management metrics reports, supporting area based management, and putting more effort into external communications. With more bottom-up support I feel like this would not seem so overwhelming and I could focus on better products going out.

I hope I have captured a good snapshot of the situation for you in a more digestible manner than a bunch of random spreadsheets and to-do lists. If you want to discuss this further, I'm happy to chat anytime.

Cheers,
Krista.

s.19(1)

Krista Sandberg

Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
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Cellular | Cellulaire [REDACTED]

s.16(2)(c)



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No further information has been removed or severed from this page

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Friday, May 31, 2019 3:56 PM
To: Sandberg, Krista
Subject: RE: Aqua lines: Sea Lice

Thanks Krista.....I'm just on a call with Allison so can't answer the phone but this is great.

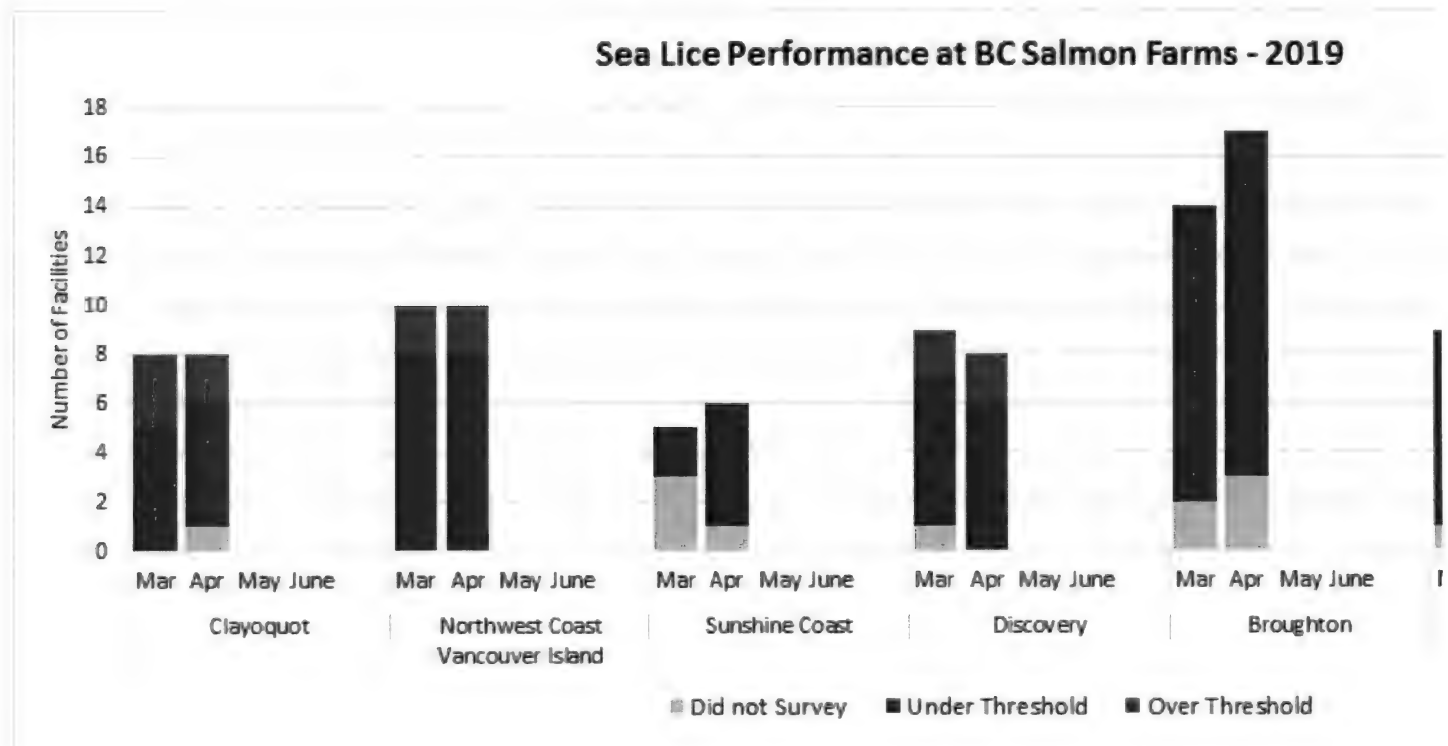
From: Sandberg, Krista
Sent: May-31-19 3:49 PM
To: Paylor, Adrienne; Manchester, Howie; Diamond, Maria
Subject: RE: Aqua lines: Sea Lice

I will let Howie/Maria respond to the note about audit data. Howie, you might be able to improve the sentence below about Esperanza as well...

The note below for Clayoquot is correct.

- In 2019, 2 of 10 active sites in the Discovery Passage area were over the 3-motile threshold during the beginning of the outmigration period. One has been treated via mechanical removal (hydrolicer) and in-feed treatment (Slice) and is now below threshold. The other is a small brood facility.
- In 2019, 3 of 3 active sites in the Esperanza Inlet area were over the 3-motile threshold during the beginning of the outmigration period. These farms are being treated with hydrogen peroxide and are actively harvesting.

Here is how things are looking for 2019, I have not yet separated out Zone 2.4 in this graph:



Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Paylor, Adrienne
Sent: May-31-19 3:17 PM
To: Sandberg, Krista; Manchester, Howie; Diamond, Maria
Subject: FW: Aqua lines: Sea Lice

Fyi.....Questions coming in so what ever we know on 2019 sea lice out migration.....

From: Bate, Dan
Sent: May-31-19 3:13 PM
To: Paylor, Adrienne
Cc: Girouard, Louise; Rainer, Michelle
Subject: Aqua lines: Sea Lice

s.16(2)(c)

Hi Adrienne – thanks for the chat just now.
Here with our existing lines for your input.

Dan

- Sea lice are naturally occurring parasites that have lived in BC's coastal waters for thousands of years. While sea lice generally do not harm adult fish, they can harm small juvenile salmon.
- Farmed fish are free of sea lice when they enter the ocean but can pick them up in the marine environment.
- The abundance of sea lice on marine salmon farms is influenced by seasonal and year-to-year variations in ocean salinity and temperature, as well as the number and species of wild salmon returning to an area.
- Fisheries and Oceans Canada's (DFO's) requirements ensure that lice numbers are lowest during the outmigration period, when wild juvenile salmon are at greatest risk. Please see the attached infographic to learn how DFO manages sea lice at BC salmon farms.
- Most years, more than 90% of sites are below the regulatory thresholds for sea lice during the outmigration period.
- Unfortunately, due to the impacts of climate change, our ocean temperatures are rising, creating favorable conditions for the growth of sea lice. The levels of lice present may have once again been high in the Clayoquot Sound region during the wild juvenile salmon outmigration period this spring.
- It is important that companies who do business on the ocean follow the rules and guidelines outlined in the Fisheries Act. in regulations, legislation and their licence conditions. This is what Canadians expect.
- In 2019, 3 of 9 active sites in the Clayoquot Sound area were over the 3-motile threshold during the beginning of the outmigration period. Two of these sites have been harvested so there are no longer concerns with sea lice levels; the third is scheduled to complete harvest by the end of May. Motiles are lice in the free-moving stage of their life cycle. Sea lice levels at the remaining 6 farms in the Clayoquot Sound area are below threshold.
- Currently, in the Broughton Archipelago, data shows that all farms were within the threshold for lice levels at farms during the 2019 outmigration period.
- DFO has performed routine sea lice audits at Broughton Archipelago and Clayquot Sound sites to verify the accuracy of industry-reported sea lice numbers and compliance with conditions of licence. In 2019, DFO has conducted **XX** site inspections at farm sites in BC. Of those inspections, **XX** of farms had levels which exceeded thresholds.

- British Columbians and all Canadians care deeply about the protection of wild pacific salmon. We do too. That is why we are taking action to ensure that all BC farms stay within levels to ensure that our migrating wild salmon have healthy waters to pass through.
- DFO's aquaculture audit and reporting program is designed to protect wild juvenile salmon as they outmigrate. Our focus is on monitoring sea lice at salmon farms to ensure that lice levels are below thresholds during the outmigration period. Results of both industry sea lice counts and DFO audits are available at www.dfo-mpo.gc.ca/aquaculture/protect-protege/parasites-eng.html.
- Licence conditions related to sea lice management can be found at www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/licence-cond-permis-mar/col-cdp-eng.html#6 . These conditions remain in effect until 2022.

Dan Bate

Team Lead, Communications
Fisheries and Oceans Canada Pacific Region / Canadian Coast Guard Western Region / Government of Canada
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Chef d'équipe, communications
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Dan.Bate@dfo-mpo.gc.ca / Tél : (604) 775-8809 / Tél. cell. : [REDACTED]

s.16(2)(c)

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Saturday, June 1, 2019 6:49 PM
To: Waddington, Zac; McConnachie, Sarah; Manchester, Howie
Subject: FW: Note for your review
Attachments: MTM_proposed enhancements to sea lice management in BC_June 1_2019_v2 (002).aw.docx

Note going up Monday for the Minister to change sea lice COL's.....if you happen to see this before then and have an important correction then let me know.....otherwise we will follow up Monday. Thx A

From: Paylor, Adrienne
Sent: June-01-19 6:46 PM
To: Patirana, Anoma
Cc: Webb, Allison
Subject: RE: Note for your review

A couple of importance adjustments in the attached.



Call me if you want to discuss any of this at any time before Monday. I'm going to share this with Zac and Sarah in case they can highlight something we missed but think we should be good 😊

Thx Adrienne

From: Webb, Allison
Sent: June-01-19 3:05 PM
To: Paylor, Adrienne
Cc: Patirana, Anoma
Subject: Note for your review

s.19(1)
s.21(1)(a)
s.21(1)(b)

Here you go – I had to send up : [REDACTED] If you have any strong concerns or changes, let Anoma know and we'll revise on Monday before this goes into the system. It's not officially in there yet.

Thanks :

Allison

Allison Webb, Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
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s.19(1)



Fisheries and Oceans
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Pêches et Océans
Canada

Fisheries Management

Gestion des Pêches

Regional Director

Directeur Régional

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AND LITIGATION PRIVILEGE**

2019-xx-xxxx

MEMORANDUM FOR THE MINISTER

**PROPOSED ENHANCEMENTS TO SEA LICE MANAGEMENT IN BRITISH
COLUMBIA
(FOR INFORMATION)**

SUMMARY OF ADVICE TO REGIONAL DIRECTOR GENERAL

While sea lice abundance exceedances over the current threshold have been relatively rare since 2011, exceedances have been observed in some areas of the BC Coast over the last two years.

This has led the Department to reconsider its current sea lice conditions of licence (COL) with a view to changing the conditions by 2020 to coincide with the next wild salmon migration window.

A number of proposed enhancements to current licence conditions are being considered including

DFO will engage Indigenous organizations, the Province of BC, Industry and conservation groups on the proposed approach for enhancing sea lice management and regulation via the multi-stakeholder technical working group (TWG) on Fish Health and/or other existing forums.

BACKGROUND

Due to elevated risk to juvenile wild salmon during their outmigration, (March 1 to June 30 of each year), marine finfish aquaculture sites require increased monitoring, reporting, notification and intervention requirements if sea lice thresholds (currently set at an average of 3 three motile (pre-adult and adult) lice (*Lepeophtheirus salmonis*) per fish) are exceeded as part of the condition of licence (COL). If there are sea lice exceedances during the outmigration period, licence holders are required to take action to reduce lice abundance.

The veracity of industry reported data is assured through auditing performed by DFO's Fish Health Audit and Intelligence Program (FHAIP). During the outmigration period, DFO increases sea lice audits to 50% of all active Atlantic salmon sites

s.21(1)(a)

s.21(1)(b)

.../2

During most years, more than 90 percent of sites in British Columbia have been below the regulatory thresholds for sea lice during the wild salmon outmigration period, but can be variable and affected by environmental conditions, thriving in warm water temperatures and high salinity levels. In the last two years, sea lice exceedances have been observed in two areas on the west coast of Vancouver Island. For example, in 2017 sea lice exceedances were observed in several Grieg farms in the Esperanza area and more recently, in 2018, sea lice exceedances were observed for Cermaq farms in Clayoquot Sound.

Challenges resolving the Clayoquot situation in 2018 led to increased scrutiny of the Department and efforts by DFO staff to work with DFO's Conservation and Protection (C&P) to lay charges were unsuccessful. On March 1, 2019, C&P issued a warning letter to Cermaq as a result of the exceedances from last year, and to relay that the situation is being closely monitored by the Department. This year, three Cermaq Canada marine finfish aquaculture sites in Clayoquot Sound were over threshold entering the outmigration period, and while being resolved have generated significant media attention.

Currently, in BC sea lice management options are limited and rely on a single therapeutant, emamectin benzoate (SLICE), to manage sea lice levels on farmed fish. DFO has been monitoring and analyzing sea lice data since 2011 for indication of SLICE resistance. DFO took samples of lice and was able to confirm that SLICE resistance was a contributing factor to the sea lice exceedances experienced in Clayoquot Sound in 2018 which was also compounded by unfavorable environmental conditions. SLICE resistance has been observed in four areas in BC (Klemtu in 2013, Quatsino in 2014, Esperanza in 2016/2017 and Clayoquot 2018). To date SLICE resistance has never been observed by DFO in the Broughton Area.

The rotational use of alternative methods is part of an integrated pest management (IPM) approach, which has been demonstrated to reduce the need for drugs/pesticides and prevent the development of resistance while minimizing environmental impacts and risks to wild fish. The Province of BC, Industry and DFO are working together to explore IPM options.

STRATEGIC CONSIDERATIONS

Given the recent emergence of sea lice exceedances in several areas of the BC coast, DFO intends to open the Conditions of Licence (COL) related to sea lice with an aim to change the current conditions by 2020 to coincide with the next wild salmon migration window.

Conservation groups and [REDACTED] have questioned the enforceability and integrity of current sea lice COL and how the Department plans to consider drug resistance in sea lice prior to issuing transfer licences for farmed fish moving between marine sites. Concerns by these groups and members of the public regarding DFO's sea lice management has led to negative and increased media inquiries based on documentation gathered through an Access to Information request where various departmental officials highlight some of their concerns with the current approach.

As challenges have emerged in several other areas of the coast with sea lice management, DFO is considering a range of new amendments to COL to allow better regulation, while also providing additional tools and guidance to industry. These include moving to a more area based approach to sea lice management consistent with the new approach to aquaculture by DFO. [REDACTED]

Implementing these improvements will require changing COL which can be achieved by demonstrating a conservation concern, or through a request to industry for voluntary consent to amend COL. A further assessment is required as well as consultation to inform the approach to opening the COL, however, it could be expected that industry would be amenable to making the request given the current public concern on these issue and the recent challenges on some of their farms. Given the need to open COL for some of the other suggested changes in the area of fish health, this could be done at one time.

BC has recently changed some of their requirements and approval processes for use of other alternative treatments that have also increased the challenges regarding sea lice treatment. In the case of hydrogen peroxide, their current permit process is lengthy and requires public consultation. [REDACTED]

[REDACTED] It will be important that any work in this area includes the BC Ministry of the Environment.

SCIENCE ADVICE

DFO Science in the Pacific Region conducts research on sea lice focusing on a number of areas. In addition, management has requested science advice on sea lice management with a focus on areas such as whether sea lice, originating from Atlantic salmon farms impact wild salmonid populations, correlation between sea lice in juvenile wild smolts and farm lice levels, identifying threshold of sea lice infection and resilience in sockeye salmon, [REDACTED] Science advice on these regulatory questions will help inform proposed amendments to sea lice COL.

INTERDEPARTMENTAL CONSULTATIONS

No other departments were consulted in developing this briefing note.

INDIGENOUS CONSULTATIONS

DFO will engage with Indigenous organizations such as the Aquaculture Coordinating Committee of the First Nations Fisheries Council and/or bilateral meetings with interested First Nations as required.

EXTERNAL CONSULTATIONS

DFO continues to work with the province of BC on integrated pest management approaches to diversify tools and test new technologies that can limit potential impacts of sea lice to wild fish. The Department will consult with BC, Industry and environment groups, and academia on proposed amendments to sea lice COL through the multi-stakeholder TWG.

ADVICE AND RECOMMENDATIONS TO THE MINISTER

Departmental officials will continue to work to refine its proposed enhancements to sea lice management in the coming months. The Department is prepared to continue its on-going briefings with you on this file, as requested.

Timothy Sargent
Deputy Minister

Kevin Stringer
Associate Deputy Minister



Fisheries and Oceans Canada
Correspondence Routing Slip

Fiche d'acheminement de correspondance
- 5 Pêches et Océans Canada

UNCLASSIFIED

GCCMS #: 2019-XXX-XXXXX

EKME #: XXXXXXXX

To: Timothy Sargent
Pour:

Date:

Object: **PROPOSED ENHANCEMENTS TO SEA LICE MANAGEMENT IN BRITISH COLUMBIA**
Objet:

From / Rebecca Reid, Regional Director General, Fisheries Management
De:

Add ADM Science, Ecosystems, etc

☐

Material for the Minister
Documents pour le Ministre

☒

Your Signature
Votre signature

☐

Information

Remarks: This briefing note was developed in consultation with the following
Remarques: regions/sectors:

Distribution:

Drafting Officer/
Rédacteur:

ANOMA PATIRANA (604) 666-9571 / Allison Webb / dw

s.23

Wilkinson, Davida

From: Keith, Ian
Sent: Monday, June 3, 2019 10:15 AM
To: McConnachie, Sarah
Subject: RE: Sea Lice Artical
Attachments: EsperanzaVet.pdf

I plugged in an old laptop that may have notes from the time; one laptop won't work without repair from a shop, this machine is more likely to have notes or data.

The draft letter was changed a lot but the point in this draft was intended [REDACTED]
[REDACTED]

In case my wee hours email lacks clarity: 1st summer in Esperanza Inlet provided few feeding opportunities because of the algal blooms. Now Grieg has high performance diffusers; then they ran a dozen diesel generators 24 hours per day for diffusers, [REDACTED] Entry would be in the fall to get some weight on before the winter and then more weight in the spring, [REDACTED]
[REDACTED]

With this historic situation, there would be therapeutic levels in an individual, or no SLICE. Short term exposure to SLICE by the motile louse would induce enzymes and perhaps have some selection pressure, but not equivalent to subtherapeutic dosing. In 2016 [REDACTED]
[REDACTED]

Ian

From: McConnachie, Sarah
Sent: June-03-19 9:40 AM
To: Keith, Ian
Subject: RE: Sea Lice Artical

Thanks – this is helpful!

From: Keith, Ian
Sent: June-03-19 2:16 AM
To: McConnachie, Sarah
Subject: RE: Sea Lice Artical

Hi Sarah,

I have a meeting at 11 that I should prepare for so prepared a historical document or you when receiving your email I have cited 2 of Saksida et al., and have included the Fish Health Report 2009 to show the 1st year FHZ 2.4 sustained elevation. I have also included the chapter we wrote that provides month sea lice data divided by year class, also showing the FHZ 2.4 1st year abundance. You really need the 2010 data to show the effect of harvesting out Esperanza in Winter 2010 but don't have these data..

Ian

s.19(1)
s.20(1)(b)
s.21(1)(a)
s.21(1)(b)

From: McConnachie, Sarah <Sarah.Mcconnachie@dfo-mpo.gc.ca>
Sent: June-02-19 1:51 PM
To: Keith, Ian <Ian.Keith@dfo-mpo.gc.ca>
Subject: FW: Sea Lice Artical

Will call tomorrow

From: Paylor, Adrienne
Sent: May-31-19 2:42 PM
To: Manchester, Howie; McConnachie, Sarah; Waddington, Zac
Subject: FW: Sea Lice Artical

From: Johansson, Todd
Sent: May-31-19 8:54 AM
To: Taekema, Bernie John; Paylor, Adrienne; McCorquodale, Brenda; Webb, Allison
Cc: Mollins, Jennifer
Subject: Sea Lice Artical

Not sure if folks have seen this but here it is.

<https://alexandramorton.typepad.com/>

Thanks:

Todd Johansson
Aquaculture Management
8585 Wollason Street
Port Hardy BC V0N 2P0
(w) 250-902-2683
(c) [REDACTED]
(f) 250-949-6755

s.16(2)(c)

**Pages 301 to / à 303
are withheld pursuant to section
sont retenues en vertu de l'article**

20(1)(b)

**of the Access to Information Act
de la Loi sur l'accès à l'information**

Wilkinson, Davida

From: Keith, Ian
Sent: Monday, June 3, 2019 2:16 AM
To: McConnachie, Sarah
Subject: RE: Sea Lice Artical
Attachments: [REDACTED] 2009 Esperanza.docx; Fish_Health_Report_2009.pdf; bioassay and SLICE.pdf; saksida 2010 emamectin.pdf; Chapter 8 Jones and Beamish 2011.pdf

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Ian

From: McConnachie, Sarah <Sarah.Mcconnachie@dfo-mpo.gc.ca>
Sent: June-02-19 1:51 PM
To: Keith, Ian <Ian.Keith@dfo-mpo.gc.ca>
Subject: FW: Sea Lice Artical

Will call tomorrow

From: Paylor, Adrienne
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s.16(2)(c)

s.19(1)

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Thanks:

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(f) 250-949-6755

There is no previous page, this page has a different font only

we see following email from October 2017, Dr Ian Keith, DFO aquaculture fish health veterinarian, wrote "*We have data back to 2008 on failure of lice management by SLICE*"

- This was a draft letter to [REDACTED] concerning sea lice management at Gore. Failure of lice management by SLICE was documented in Esperanza Inlet in 2016 and 2008. Lees et al. (2008) defined an effective treatment in Scotland as a treatment where the abundance of motile *L. salmonis* fall to <40% of their pretreatment level at some point in the 13 weeks post-treatment.
 - At Esperanza, **10 weeks post treatment** (treatment Sept 13-19), **10 motiles/fish**; the last abundance I have is **for July, 4.5 motiles/fish**.
 - At Steamer, **10 weeks post treatment** (treatment Sept 13-19), **13.6 motiles/fish**; **pre-treatment, 14.5 motiles/fish**.
- In Fall 2008 Esperanza was over threshold in July & August as they harvested out; Steamer and Hecate were Fall 2007 entries. Steamer was over threshold in September 2008 and treated; abundance went from 10.8 to .46 in December (using Cohen Exhibit), defining effective treatment (Lees et al., 2008). The 2009 sea lice data are not in Cohen Exhibits, but in March Steamer had 2.0 and in June .93. Hecate was over threshold in December 2008 and treated in February; by May 2009 abundance was 0.66.
- After harvesting out, Esperanza was restocked, resulting in 1st year and 2nd year fish in the same inlet. (Lutes was stocked too, but used as a smolt entry site.) Esperanza was above threshold in Fall 2009 and was treated 21 Oct 2009. A substantial proportion of fish were not on feed at this time, typical for 1st year fish in Nootka/Esperanza after long periods of blooms in the summer and as late as 15 October. The abundance appeared to remain high as the fish that did not feed became a refuge for the lice. The lice abundance increased and rather than doing a second treatment and risking resistance, [REDACTED] ordered that these Esperanza fish be harvested out as 1st year fish to return the inlet to a single year class area.
 - [REDACTED] had film crews present on the harvest and had photographs of motile lice on the harvest boat hull etc. **This was a failure of lice management by SLICE but other bioassay data published by Marine Harvest (Saksida et al., 2013) demonstrated efficacy and no resistance presence at the time.**

Note: I would have to get my personal laptop working in order to provide you with what I had recorded in terms of Esperanza data shared by [REDACTED] at the time, and phone response to [REDACTED] at the time. I told [REDACTED] that [REDACTED] actions were exemplary.

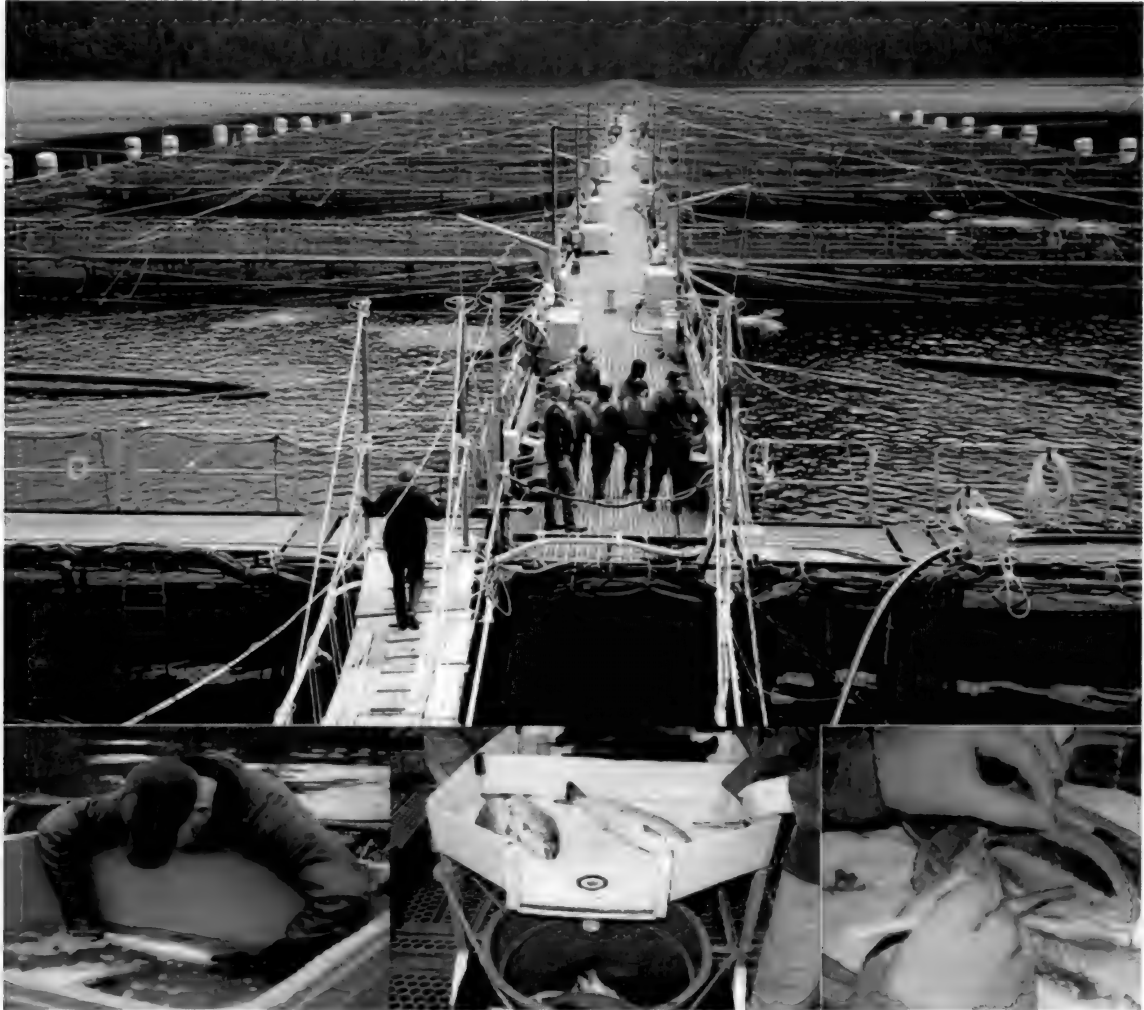
2009

Ministry of Agriculture and Lands

Animal Health Branch – Fish Health

Available at

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/fisheries-and-aquaculture/aquaculture-reports/fish_health_report_2009.pdf



ANNUAL REPORT FISH HEALTH PROGRAM

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Available at <https://onlinelibrary.wiley.com/doi/full/10.1111/jfd.12018>

Short Communication

Use of Atlantic salmon, *Salmo salar* L., farm treatment data and bioassays to assess for resistance of sea lice, *Lepeophtheirus salmonis*, to emamectin benzoate (SLICE®) in British Columbia, Canada

S M Saksida¹, D Morrison², P McKenzie³, B Milligan⁴, E Downey¹, B Boyce² and A Eaves¹

¹ BC Centre for Aquatic Health Sciences, Campbell River, BC, Canada

² Marine Harvest Canada, Campbell River, BC, Canada

³ Mainstream Canada, Campbell River, BC, Canada

⁴ Grieg Seafood BC, Campbell River, BC, Canada

Keywords: farmed salmon, sea lice, treatment efficacy.

Sea lice, *Lepeophtheirus salmonis* and some *Caligus* spp., are naturally occurring ectoparasites on wild salmon (Nagasawa 2001; Beamish *et al.* 2005) and have had the greatest economic impact of any parasite in salmonid fish farming globally (Johnson *et al.* 2004; Costello 2006). In contrast, there is clear evidence that these parasites are seldom a production or fish health concern on salmon farms in British Columbia (BC), Canada (Saksida *et al.* 2007). Nevertheless, due to concerns regarding the potential impact of sea lice originating from farmed Atlantic salmon, *Salmo salar* L., on wild Pacific salmon species in BC, their effective control continues to be a subject of considerable interest (Morton & Williams 2003; Marty, Saksida & Quinn 2010). In 2003, government regulatory authorities established requirements that farms maintain lice abundance below a threshold of three motile stage (adult and preadult stages) *L. salmonis* between March and June (Saksida *et al.* 2007). To meet these requirements, reduction of lice could be accomplished through harvesting or treatment. Macrocytic lactone types of

therapeutants have been almost exclusively used for the treatment of sea lice in BC; ivermectin that has been reported to have a low margin of safety to Atlantic salmon was used in the 1990's and then replaced by emamectin benzoate (EMB), (SLICE®; Merck Animal Health) when it became available in 1999 (Johnson *et al.* 1993; Palmer *et al.* 1996; Saksida *et al.* 2011). Consequently, SLICE® has been the only product used in the treatment of sea lice in BC for the last decade (Saksida *et al.* 2011).

A dependence on a single or limited number of therapeutants for sea lice has resulted in reports of reduced efficacy of products containing EMB in salmon farming regions other than BC (Bravo, Sevatdal & Horsberg 2008; Lees *et al.* 2008; O'Donohue *et al.* 2008; Igboeli *et al.* 2012). In this study, we evaluated whether sea lice resistance to EMB is also developing in BC. Two approaches were taken to examine for EMB resistance: (1) determine the effective dose (EC₅₀) in laboratory bioassays by exposing adult sea lice collected from farmed salmon to a range of EMB treatment concentrations *in vitro* and (2) examine sea lice and SLICE® treatment data collected from the same farms that were involved in the bioassay study and assess for change in treatment efficacy.

Sea lice (motile *L. salmonis* stages) were collected from farms located in five areas of the BC coast between 2010 and 2012. The collection was similar that described in Westcott *et al.* (2008). Sea water used in the bioassay was also collected at the farm.

Correspondence S M Saksida, British Columbia Centre for Aquatic Health Sciences, PO Box 277 Island Highway, Campbell River, BC, Canada V9W 2P0 (e-mail: sonja.saksida@cahs-bc.ca)



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Available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/jfd.12018>

Short Communication

The efficacy of emamectin benzoate against infestations of sea lice, *Lepeophtheirus salmonis*, on farmed Atlantic salmon, *Salmo salar* L., in British Columbia

S M Saksida¹, D Morrison² and C W Revie³

¹ British Columbia Centre for Aquatic Health Sciences, Campbell River, BC, Canada

² Marine Harvest Canada, Campbell River, BC, Canada

³ University of Prince Edward Island, Charlottetown, PEI, Canada

Keywords: British Columbia, efficacy, emamectin benzoate, *Lepeophtheirus salmonis*, treatment.

Sea lice are a naturally occurring ectoparasite of wild salmon (Nagasawa 2001; Beamish, Neville, Sweeting & Ambers 2005). There is also clear evidence that these parasites are seldom a production or fish health concern on farms in British Columbia (Saksida, Constantine, Karreman & Donald 2007), in direct contrast to most other salmon-producing regions (Heuch, Revie & Gettinby 2003; O'Donohoe, Kane, Kelly, Nixon, Power, Naughton & Jackson 2008; Lees, Gettinby & Revie 2008a). Nevertheless, owing to concerns regarding the potential impact of sea lice originating from farmed Atlantic salmon, *Salmo salar* L., on wild Pacific salmon species, *Oncorhynchus* spp., in BC, their effective control continues to be a subject of considerable interest (Morton, Routledge, Peet & Ladwig 2004; Krkošek, Ford, Morton, Lele, Myers & Lewis 2007). Indeed, it has been suggested that the recent reductions in sea lice infestations on wild salmonids in the Broughton Archipelago (an area of major research focus over the past 5 years) are a consequence of improved lice management actions on salmon farms (Harvey 2009). While a number of management practices, such as single

year-class production and between-cycle fallowing, can have a positive effect on lice control within farms, the most direct effects are associated with the use of medicines to control sea lice. This is particularly the case if a goal is to minimize lice numbers at a specific point in the production cycle, for example during the period when wild smolts are most likely to be migrating past farms.

In 2003, BC regulatory authorities established requirements that farms maintain lice abundance below a threshold of three motile stage *Lepeophtheirus salmonis* between March and June (Saksida *et al.* 2007). In 2004, these same authorities commenced a sea lice surveillance programme where between 25% and 50% of active Atlantic salmon farms were assessed by government biologists for sea lice during each quarter to verify reported levels (Saksida *et al.* 2007). These regulations have not changed. In BC, the only product that is currently available to treat sea lice on salmon farms is SLICE[®] (Intervet Schering-Plough Animal Health). SLICE[®] is an oral formulation of emamectin benzoate, which is added to fish feed and delivered at a dosage of 0.5 µg kg⁻¹ fish for 7 days. There have been a number of reports indicating reduced efficacy of emamectin benzoate when used on farmed fish in a range of other salmon-producing countries. These include Chile (Bravo, Sevatdal & Horsberg 2008) and Scotland (Lees, Baillie, Gettinby & Revie 2008b), with less well-documented reports in Ireland (O'Donohoe *et al.* 2008 – non-specific report of 'reduced sensitivities',

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(e-mail: sonja.saksida@cahs-bc.ca)



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Chapter 8

Sea Lice Management on Salmon Farms in British Columbia, Canada

*Sonja M. Saksida, Diane Morrison, Mark Sheppard,
and Ian Keith*

Introduction

In Canada, salmon farming occurs in British Columbia and in a number of the provinces that border the Atlantic Ocean on Canada's east coast—primarily New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland. The salmon farming industry in British Columbia is significantly bigger than the east coast industry and on its own is considered the fourth largest salmon farming area in the world. A relative newcomer amongst the province's agriculture-based industries, the salmon farming sector has grown rapidly to become a vital part of the local economy in many coastal communities. In the span of 20 years, the salmon farming industry has become the province's largest agricultural exporter and an enormous contributor to coastal economies. Farmed Atlantic salmon (*Salmo salar*) is the province's single-most significant commodity with the largest harvest and highest landed value of any species—wild or cultured. In 2008, the farm gate value of Atlantic salmon was estimated to be \$394.1 million dollars (British Columbia Ministry of Environment 2009).

The first salmon farm in British Columbia began operation in 1971. The salmon aquaculture industry developed quickly from 12 operating farms in 1984 to 137 tenures in 2009 (Figure 8.1). In general, only 70–90 of these tenures operate at any one time, thus allowing others to fallow. Since the mid-1990s, very few new farm tenures have been made available; and in 2008, a moratorium was placed on salmon farm expansion into the province's north coast.

Through rationalization and consolidation, the number of companies has declined from 70 in 1989 to 14 in 2002 and by 2008 only four major salmon producers remained: three rearing Atlantic salmon and one rearing chinook salmon (*Oncorhynchus tshawytscha*) (Figure 8.1). In addition to these four companies, a few smaller producers who raise mainly Pacific salmon species continue to operate.

In the early days of fish farming, mostly Pacific salmon species—chinook and coho (*Oncorhynchus kisutch*) salmon—were raised. Over time, there was a gradual switch to Atlantic salmon that were better suited to being reared in a cultured environment and,

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Wilkinson, Davida

From: Keith, Ian
Sent: Monday, June 3, 2019 3:16 PM
To: McConnachie, Sarah
Subject: FW: Sea Lice Artical
Attachments: lees efficacy of SLICE 2008.pdf

Hi Sarah,
I'm caught up if you wanted to chat.
Ian

From: Keith, Ian
Sent: June-03-19 2:16 AM
To: McConnachie, Sarah
Subject: RE: Sea Lice Artical

Hi Sarah,
I have a meeting at 11 that I should prepare for so prepared a historical document or you when receiving your email I have cited 2 of Saksida et al., and have included the Fish Health Report 2009 to show the 1st year FHZ 2.4 sustained elevation. I have also included the chapter we wrote that provides month sea lice data divided by year class, also showing the FHZ 2.4 1st year abundance. You really need the 2010 data to show the effect of harvesting out Esperanza in Winter 2010 but don't have these data..
Ian

From: McConnachie, Sarah <Sarah.Mcconnachie@dfo-mpo.gc.ca>
Sent: June-02-19 1:51 PM
To: Keith, Ian <Ian.Keith@dfo-mpo.gc.ca>
Subject: FW: Sea Lice Artical

Will call tomorrow

From: Paylor, Adrienne
Sent: May-31-19 2:42 PM
To: Manchester, Howie; McConnachie, Sarah; Waddington, Zac
Subject: FW: Sea Lice Artical

From: Johansson, Todd
Sent: May-31-19 8:54 AM
To: Taekema, Bernie John; Paylor, Adrienne; McCorquodale, Brenda; Webb, Allison
Cc: Mollins, Jennifer
Subject: Sea Lice Artical

Not sure if folks have seen this but here it is.

<https://alexandramorton.typepad.com/>

Thanks:

Todd Johansson
Aquaculture Management
8585 Wollason Street
Port Hardy BC V0N 2P0
(w) 250-902-2683
(c) [REDACTED]
(f) 250-949-6755

s.16(2)(c)

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The Efficacy of Emamectin Benzoate against Infestations of *Lepeophtheirus salmonis* on Farmed Atlantic Salmon (*Salmo salar* L) in Scotland, 2002–2006

Fiona Lees^{1,2}, Mark Baillie², George Gettinby¹, Crawford W. Revie^{2*}

1 Department of Statistics and Modelling Science, University of Strathclyde, Glasgow, United Kingdom, **2** Department of Computer and Information Sciences, University of Strathclyde, Glasgow, United Kingdom

Abstract

Background: Infestations of the parasitic copepod *Lepeophtheirus salmonis*, commonly referred to as sea lice, represent a major challenge to commercial salmon aquaculture. Dependence on a limited number of therapeutants to control such infestations has led to concerns of reduced sensitivity in some sea lice populations. This study investigates trends in the efficacy of the in-feed treatment emamectin benzoate in Scotland, the active ingredient most widely used across all salmon producing regions.

Methodology/Principal Findings: Study data were drawn from over 50 commercial Atlantic salmon farms on the west coast of Scotland between 2002 and 2006. An epi-informatics approach was adopted whereby available farm records, descriptive epidemiological summaries and statistical linear modelling methods were used to identify factors that significantly affect sea lice abundance following treatment with emamectin benzoate (SLICE[®], Schering Plough Animal Health). The results show that although sea lice infestations are reduced following the application of emamectin benzoate, not all treatments are effective. Specifically there is evidence of variation across geographical regions and a reduction in efficacy over time.

Conclusions/Significance: Reduced sensitivity and potential resistance to currently available medicines are constant threats to maintaining control of sea lice populations on Atlantic salmon farms. There is a need for on-going monitoring of emamectin benzoate treatment efficacy together with reasons for any apparent reduction in performance. In addition, strategic rotation of medicines should be encouraged and empirical evidence for the benefit of such strategies more fully evaluated.

Citation: Lees F, Baillie M, Gettinby G, Revie CW (2008) The Efficacy of Emamectin Benzoate against Infestations of *Lepeophtheirus salmonis* on Farmed Atlantic Salmon (*Salmo salar* L) in Scotland, 2002–2006. PLoS ONE 3(2): e1549. doi:10.1371/journal.pone.0001549

Editor: Ross Thompson, Monash University, Australia

Received: October 5, 2007; **Accepted:** January 14, 2008; **Published:** February 6, 2008

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Funding: The database underpinning this work was created as part of two UK government funded research projects (MAFF LINK-ENV12; DEFRA-VM0213). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

*E-mail: crawford.revie@cis.strath.ac.uk

Introduction

Commercial farming of Atlantic salmon (*Salmo salar* L.) has developed rapidly since the 1970's, with global production exceeding one million tonnes per annum since 2002 [1]. Atlantic salmon farming is currently dominated by the aquaculture industries of Norway and Chile, however Scotland and Canada are also major producers.

As intensive marine aquaculture developed, the threat posed to fish health and production by infestations of parasitic copepods emerged as one of the greatest challenges facing the industry [2]. Not only can these aquatic parasites inhibit growth and cause extensive damage, extreme infestation can lead to host mortality [3]. It has also been suggested that caligid copepods, commonly referred to as sea lice, originating from salmon farms may pose a risk to wild salmonid populations [4–8].

In Scotland two species of sea lice parasitise farmed salmonids: *Lepeophtheirus salmonis* (Krøyer 1837) and *Caligus elongatus* (Nordmann 1832). Of the two species, *L. salmonis* is the larger and more abundant [9]. Whereas *C. elongatus* is known to parasitise more

than 80 species of fish, the major species of interest *L. salmonis* is principally confined to salmonids [10].

In response to the challenges presented by sea lice infestation, salmon producers on the west coast of Scotland have developed integrated health management programmes based on previous research into the epidemiology of sea lice [11–14] and farm management practices [15–18]. Some of these management strategies have proven to be successful and, together with the availability of more effective ectoparasitic medicines, have helped to reduce the abundance of *L. salmonis* and *C. elongatus* on Scottish farms over the past decade [19]. Nevertheless, sea lice remain a persistent problem and the cost of controlling these parasites is substantial [18].

The availability and use of medicines to control sea lice burdens in Scotland has changed considerably in the last decade and since 2005 only two therapeutants have been in common use; the topical treatment cypermethrin (Excis[®], Novartis Animal Health) and the in-feed treatment emamectin benzoate (SLICE[®], Schering Plough Animal Health). Both ectoparasiticides are widely used and, since obtaining UK Market Authorisation in 2000, the use of

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alexandra morton

Available at https://alexandramorton.typepad.com/alexandra_morton/2019/05/sea-lice-control-built-to-fail.html

alexandra morton

[Safe to eat?](#)

[In Norway](#)

[DONATE](#)

Sea lice Control - Built to Fail

I recently received 1,200 pages of internal DFO communication on the escalating sea louse outbreaks on salmon farms. In summary, DFO knew their laws to control sea lice on salmon farms were unenforceable. Not surprising, as upper DFO management consulted with the salmon farming industry to write them. They were designed to prevent companies from being charged and penalized for allowing their lice to eat wild salmon to death. DFO hid the fact that the one drug used in BC to control lice was failing, the lice had become resistant to it here as elsewhere. The fishery officers and vets on the ground tried to stop the farms from killing wild salmon, but their "hands were tied" because the Conditions of Licence issued to the farmers had a loop hole big enough to allow the death of millions of wild salmon with no consequence to the farmers.

In this era of mass extinctions DFO is aiding and abetting the salmon farming industry is causing the extinction of wild salmon runs and all that depend on them.

This is all from ATIP A-2018-00799 a document detailing the two outbreaks in 2017 and then in 2018. Today, DFO is allowing this to happen again and now we know why.

Global News Hour at 6

Documents indicate federal fisheries officials can't control fish farms

Drug Resistance

While the salmon farming industry and DFO repeated up until the spring of 2018 that there was no evidence of drug resistance in farm salmon in BC, we see following email from October 2017, Dr Ian Keith, DFO aquaculture fish health veterinarian, wrote "*We have data back to 2008 on failure of lice management by SLICE*" ([Download](#))

Drug resistance in sea lice in salmon farms, is a leading cause of the decline of wild salmon and sea trout in other countries. It has proven to be inevitable everywhere the industry operates and for DFO to co-write toothless regulations with industry, even as people in BC became increasingly concerned about the impact salmon farms on wild salmon, is an act of collusion with the industry.

NOOTKA SOUND Grieg Sea Food - 2017

Jan 27 Adrienne Paylor, Regional Aquaculture coordinator, produced a summary on the growing sea louse problem in Nootka Sound. She says DFO learned about the failure of the in-feed drug Slice in controlling sea lice in the Nootka Sound Grieg farms on October 26th 2016. In January as sea lice numbers soared in their farms, Grieg's plan was to borrow a barge from Marine Harvest to apply hydrogen peroxide, but they were unable to get the barge ([Download page 97](#)) and the special equipment Grieg needed to deliver the treatment "hasn't been manufactured yet" ([Download page 133](#)). By Feb 22 2017, one of the farms had 15 times more lice than allowed ([Download page 136](#)). She notes this information may be discovered by ATIP and "This will reflect badly on the Department's regulatory role and on the salmon farming industry..." with no mention of the impact this will have on the wild chum populations in the region. However, she wrote, I did discover this via ATIP and it points to collusion between industry and DFO in the demise of the 2017 juvenile wild salmon outmigration through Nootka.

Dr. Ian Keith (DFO) however, understood the ramifications of all these lice and he began writing a number of exceptionally strongly worded emails including one on Jan 27, 2017 that says he knew Grieg was going to use harvesting as their only response to the high lice numbers which was too slow to help the wild salmon. He says he was warned about the weak licence conditions, and raised a red flag that there are "*conservation units of concern (Chinook) in Esperanza Inlet.*" Most of this point is redacted ([Download page 92](#)). Thank you Dr. Keith for being the only person who tried to protect wild salmon through this.

Fish from the Grieg's Steamer Point farm, where sea lice resistance were uncontrollable, were transferred to farms in Clio Channel in the Broughton Archipelago, where lice levels reached threshold levels in Jan 2017. DFO trusted Grieg to do the bioassay on the lice on these fish to determine drug resistance levels. There was no further mention of this situation even tho, drug resistance is a serious threat to wild salmon, Grieg was clearly unprepared to deal with it, and appear to have exposed a new region to threat. Clio Channel is the territory of First Nation that is very pro salmon farming and they did nothing to stop this, if they even knew. ([Download page 94](#)).

Dr. Keith tried to explain that Grieg's own husbandry was aggravating the growing drug resistance. On October 12, 2017 he wrote to DFO's Zac Waddington to explain that the way Grieg Seafood was stocking their farms with salmon of different sizes, meant that the smaller fish would not uptake the drug SLICE, soaked into the feed, and so there would not be "uniform therapeutic dosing." He warned that continuing to use the drug in a region where the lice were becoming resistant was dangerous and would increase resistance. He asks if we want to repeat the mistakes made in the Bay of Fundy ([Download page 304](#)).

January 20, 2017 Ian Keith says "*Karen [Calla], Director BC Aquaculture Resource Management, has to be warned that within pen fish size variation is the greatest risk we have for sustainability of BC salmon aquaculture... you can't inject every fish; you have to be able to use medicated feed... with such size variation you can't get therapeutic doses in all your fish*" he says using different size fish will cause drug resistance whether to sea lice drugs or antibiotics. He goes on to say that in a meeting with ENGOS (Living Oceans, Watershed Watch, DSF, and myself) Jon Chamberlin (DFO) said the solution was more drugs, but Ian states this is "*regressive*" and will make the drug resistance problem bigger ([Download page 82](#)).

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Wilkinson, Davida

From: Sandberg, Krista
Sent: Thursday, June 6, 2019 11:56 AM
To: Manchester, Howie; Paylor, Adrienne
Subject: RE: For approval: Tyee questions on sea lice

Yes, I will work on this. Maybe see if I can start uploading individual counting events into AQUIS instead of the monthly averages. It's a big task at this point, but an important one.

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



Government
of Canada

Gouvernement
du Canada

Canada

From: Manchester, Howie
Sent: June-06-19 11:45 AM
To: Sandberg, Krista; Paylor, Adrienne
Subject: RE: For approval: Tyee questions on sea lice

Thanks Krista,

Yes, Adrienne and I spoke about this, we probably need to be more specific for our needs where we can see the results of each sampling event (3 counts done within 5 days averaged equals one sampling event), It is the sampling event that the threshold is based on, not individual pen or monthly average.

Howie

From: Sandberg, Krista
Sent: June-06-19 11:30 AM
To: Manchester, Howie; Paylor, Adrienne
Cc: Rainer, Michelle
Subject: RE: For approval: Tyee questions on sea lice

That's a good point, Howie, and something that gets missed in the way that I assess these exceedances. The Wicklow case is very rare - they exceeded at the end of the month but very minimally, and were low at the beginning of the month so their monthly average was still below threshold. This isn't picked up in the way we do the public reporting so we may need to add in a comment to reflect cases like this? I can adjust our internal graph to show one exceedance for April in the Broughton. Simmonds has remained well below threshold.

s.16(2)(c)

• Currently, in the Broughton Archipelago, data show that all farms were within the threshold for lice levels at farms during the 2019 outmigration period. One facility exceeded at the end of April but treated with Slice and is now under threshold.

I just spoke with [REDACTED] and Wicklow treated with Slice and is now clean and was checked by indigenous monitors this week.

Note that we will receive the May lice counts in about a week, but as of April, no other farms were over threshold.

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
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Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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Canada

From: Manchester, Howie
Sent: June-06-19 11:05 AM
To: Sandberg, Krista; Paylor, Adrienne
Subject: RE: For approval: Tyee questions on sea lice

Yes, Krista is correct, although Hardwicke and Shaw are technically zone 3.3, these are considered in the Discovery area. On that note I believe Simonds Point, which is zone 3.4 is still considered the Broughton. I believe this farm has and is under threshold, Krista?

Krista, Wicklow went over in April and I believe they treated with SLICE, did you get new information indicating they are now below threshold?

Howie

From: Sandberg, Krista
Sent: June-06-19 10:34 AM
To: Paylor, Adrienne; Manchester, Howie
Subject: RE: For approval: Tyee questions on sea lice

Hardwicke and Shaw went over but they are considered Discovery Passage area. All Broughton Farms are under threshold.

s.16(2)(c)

s.19(1)

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
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From: Paylor, Adrienne
Sent: June-06-19 10:19 AM
To: Sandberg, Krista; Manchester, Howie
Subject: FW: For approval: Tyee questions on sea lice
Importance: High

I don't think it is correct to say all farms in the broughton are within threshold...Hardwick went over in April or may right
.....

From: Rainer, Michelle
Sent: June-06-19 10:16 AM
To: Paylor, Adrienne
Subject: FW: For approval: Tyee questions on sea lice
Importance: High

Hi Adrienne,

Argh. Completely forgot to add these two lines, which are needed to address his questions on Broughton & Clayoquot. Previously approved but please let me know if you have any concerns:

- Currently, in the Broughton Archipelago, data show that all farms were within the threshold for lice levels at farms during the 2019 outmigration period. Approved
- For the past few years in Clayoquot Sound, the typical drop in salinity that comes with winter and spring rains has not occurred. This higher salinity has resulted in increased lice production in the region and exacerbated the lice levels on farms. Approved

Issue: [REDACTED] the Tyee ([REDACTED]) Reporter has questions about sea lice outbreaks in Clayoquot and the Broughton this year.

Deadline: June 6, noon PST

Approved by: Kerra Shaw, Howie Manchester, Adrienne Paylor, Allison Webb, Andy Thomson

s.19(1)

Will the DFO amend its COL to prevent companies from using harvesting, for example, as a treatment tool? To date industry has failed to manage sea lice epidemics and their impacts on wild salmon. Is the DFO going to change its protocols for managing sea lice?

- Licence conditions related to sea lice management can be found at: www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/licence-cond-permis-mar/col-cdp-eng.html#6. These conditions remain in effect until 2022. approved
- DFO takes an adaptive management approach to aquaculture. We are examining data from our fish health audit and surveillance program and considering options to improve our management of sea lice in BC. Approved
- We continue to work with the province of BC on integrated pest management approaches to diversify tools and test new technologies that can limit potential impacts of sea lice to wild fish. Approved
- Harvesting remains an effective measure for reducing sea lice levels at salmon farms in BC. new

Was Cermaq charged for failing to comply with licence conditions?

- DFO has reviewed Cermaq Canada's sea lice management practices in Clayoquot and, in March 2019, issued a warning letter to the company for violation of certain conditions of licence. In total, 7 compliance issues were found. **approved**
- DFO communicated closely with Cermaq Canada staff to ensure that the company was prepared for the 2019 wild salmon out migration period and managed sea lice levels through treatment, harvest or other appropriate measures. **approved**

Will the DFO charge any companies for breaking its condition of licence based on exceedances in Clayquot Sound and the Broughton this year?

- **Currently, in the Broughton Archipelago, data show that all farms were within the threshold for lice levels at farms during the 2019 outmigration period. Approved**
- **For the past few years in Clayoquot Sound, the typical drop in salinity that comes with winter and spring rains has not occurred. This higher salinity has resulted in increased lice production in the region and exacerbated the lice levels on farms. Approved**
- DFO's requirements are designed to ensure that lice numbers are lowest during the outmigration period, when wild juvenile salmon are at greatest risk. Please see the attached infographic to learn how DFO manages sea lice at BC salmon farms. **Approved**
- Exceeding thresholds for sea lice is not a licence violation but a trigger to implement management measures to bring lice levels down. Failure to implement management measures to reduce sea lice levels is a licence violation. **New**
- In 2019, 3 of 9 active sites in the Clayoquot Sound area were over the 3-motile threshold during the beginning of the outmigration period. Two of these sites have been harvested so there are no longer concerns with sea lice levels; the third is scheduled to complete harvest by mid-June. **new**
- Sea lice levels at the remaining 6 farms in the area are below threshold. **new**
- DFO is currently performing routine sea lice audits at Clayquot sites to verify the accuracy of industry-reported sea lice numbers and compliance with conditions of licence. Staff have so far completed sea lice audits at 5 of 8 sites and lice levels are very low in the 5 sites audited. **New**

Does Cermaq currently have the technology, training and capacity to treat all farms in a timely manner for sea lice?

- Cermaq Canada has invested in new technologies, such as a hydrolicer for mechanical removal of sea lice, and is using alternative drug treatments in the marine environment and in freshwater hatcheries prior to ocean transfer. Through these drug treatments and accelerated harvest, Cermaq has stayed in compliance throughout the 2019 outmigration period. Please contact the company for further information on training and investments. **new**
- We will continue to communicate with Cermaq Canada and other companies to ensure that licence requirements are understood and followed. **Approved**
- Most years, more than 90% of sites are below the regulatory thresholds for sea lice during the outmigration period. Results of both industry sea lice counts and DFO audits are available at www.dfo-mpo.gc.ca/aquaculture/protect-protege/parasites-eng.html. **approved**

Sea lice have become a billion dollar problem for the salmon farming industry for which no effective controls exist. How does the DFO plan to address that issue?

- There are many effective therapeutant and non-therapeutant treatment options to manage sea lice on farms in BC. DFO has been working with the province of BC and industry to develop alternative tools to manage sea lice. **approved**
- New treatment methodology, and husbandry practices are becoming widely adopted along the coast, which are reducing the reliance on SLICE to manage lice at sites. Some examples include: mechanical removal technologies (e.g., hydrolicer), hydrogen peroxide treatment, area-based management (e.g., coordinated treatments, stocking and fallowing of sites in an area) and pre-treatment of smolts in the hatchery with anti-louse medication. **approved**
- The rotational use of these technologies is part of an Integrated Pest Management approach, which has been demonstrated to reduce the need for drugs/pesticides and prevent the development of resistance. **approved**

What impact does the DFO calculate that sea lice epidemics have had on population levels of wild salmon. Norwegian studies suggest an annual 10 percent mortality. What studies on mortality have the DFO done?

- Scientist Simon Jones will answer this question in phone interview with reporter.

No information has been removed or severed from this page

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Monday, June 10, 2019 3:56 PM
To: McConnachie, Sarah; Price, Derek; Manchester, Howie; Waddington, Zac
Subject: FW: IPM document that went to FAIAP in 2017
Attachments: Integrated Pest Management_FAIAP_July21,2017.pdf

Not sure if you have all seen this document that we worked on a couple of years ago with Industry in the Strategic Working group. I am looking for a final copy but I think the plan was for AEO fish health to take it to the next level. Perhaps we should dust it off and see if we can progress it further

Adrienne

From: Chamberlain, Jon
Sent: June-04-19 5:02 PM
To: Paylor, Adrienne
Subject: IPM document that went to FAIAP in 2017

I think I started this document and it was finished by Robyn Kenyon and presented to FAIAP.
I do not know whether the recommendations/next steps were actioned.
This had input/was checked by a number of people who have expertise and history in the sea lice field.

There is some good background – especially in the Appendices.

This is on the aqua drive.

Good luck

Jon Chamberlain
Head, Ocean Modelling and Predictions Section
Ocean Sciences Division | Division des sciences océaniques
Institute of Ocean Sciences | Institut des sciences de la mer
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s.16(2)(c)

s.21(1)(a)

s.21(1)(b)

**Report of the DFO-Industry Marine Finfish
Strategic Working Group (SWG) to the
Finfish Aquaculture Industry Advisory Panel
(FAIAP) on:**

**Integrated Pest Management Approach to
Sea Lice Management for BC Atlantic
Salmon Aquaculture Facilities**

July 14, 2017

FINAL DRAFT FOR REVIEW

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Overview

The Atlantic-salmon farming sector in British Columbia and the Fisheries and Oceans Canada (DFO) recognize the urgent need to develop and implement a comprehensive Integrated Pest Management (IPM) strategy for sea lice. An IPM strategy will assist in meeting DFO management objectives for wild and farmed fish and will enable salmon farmers to manage sea lice in the best interest of animal welfare and productivity.

Currently, in British Columbia, sea lice management options are limited and the majority of farms rely on a single therapeutant, emamectin benzoate, to manage sea lice levels on farmed fish. There is a real concern that this treatment will become ineffective with continued consecutive use, as has occurred in other salmon regions worldwide.

IPM is founded on a commitment to continual improvement through the development/adoption of new technology (tools), management processes and treatments as they become available. All IPM plans include: prevention, monitoring, thresholds for action, and control through a suite of management tools (physical, biological and chemical). DFO and the BC salmon farming sector agree on the essential components of an IPM strategy for BC as described in Table 1 below.

Table 1 Essential Components of Sea Lice IPM Strategy for BC

- 1** – Development of a strategic sea lice management program that promotes farmed salmon health and minimizes the effects of sea lice on both farmed salmon and wild fish.
- 2** – Optimization of sea lice treatments to achieve maximum efficacy while minimizing environmental residues and potential effects on non-target organisms.
- 3** – Reduction in resistance development to management tools by having a suite of management options available.
- 4** – Commitment to investigation, and implementation of new management tools including development of enabling permitting and use regulations.

Sea lice are naturally occurring pests that infest farmed salmon and a variety of wild fish including Pacific salmon. In British Columbia, DFO regulates sea lice levels on farmed salmon through the conditions of license for each salmon farm as a precautionary approach to ensure impacts to wild fish are minimized. Regulatory oversight includes monitoring, reporting, and setting thresholds for management action. Salmon farming veterinarians and fish health staff are responsible for sea lice management programs.

The purpose of this document is for DFO and the BC salmon farmers to convey the immediate need for a comprehensive IPM for sea lice management in British Columbia.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

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This document is the result of a collaborative effort between the BC Salmon Farmers Association members and DFO Aquaculture Management under the guidance of the DFO-Industry Marine Finfish Strategic Working Group. The context is not regulatory or scientific in nature. It reflects the opinions and expertise of a range of subject matter experts (SMEs) to set out a State of Knowledge of best practice around Integrated Pest Management Approaches for Marine Finfish Aquaculture.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Sea Lice in British Columbia

Two main species of sea lice occur on Atlantic salmon in BC - *Lepeophtheirus salmonis* (the 'salmon louse') and to a lesser extent *Caligus clemensi* (the 'herring louse'). Both species are naturally occurring parasites that attach to skin, fins and gills of fish and feed on the mucus and skin. Their distribution varies seasonally, annually and regionally on both farmed and wild salmon. The intensity of infections also varies by species, location and years. Water temperature, salinity and water movement are the major factors influencing the prevalence of sea lice as is the number of returning wild fish in the area. Other types of marine fish (herring, stickleback, rockfish, greenling, ratfish and Pollock) are also known to host sea lice and may serve as reservoirs.

The number of sea lice on farmed Atlantic salmon is influenced by many factors including the age of the salmon and the time in seawater; location and season; salinity and numerous other environmental factors affecting both the sea lice and the host; proximity to sources of sea lice; and application of sea lice treatments.

In addition to these factors, there is a wide range of susceptibility among the different species of Pacific salmon that also varies with size of the fish. Atlantic salmon have greater susceptibility and are less likely to shed sea lice compared to Pacific salmon. See Appendix A for more information on sea lice management in BC and Appendix B for information on sea lice life history, abundance and distribution, and host susceptibility.

Sea Lice and Aquaculture

BC farmed salmon begin their lives in freshwater hatcheries and are transferred to ocean net pens lice free. Once in the ocean, farmed salmon are exposed to sea lice from a variety of sources, particularly in the fall as adult wild salmon carrying sea lice return to the coast from the open ocean. The focus of an IPM strategy is to manage sea lice levels: 1) in compliance with Pacific Aquaculture Regulations conditions of licence aimed at mitigating impacts to wild fish, and 2) to enable salmon farmers to manage pests for the best interests of animal care and productivity. DFO has established and uses the three motile sea lice threshold as a precautionary measure for conservation of wild salmon.

To date, the impact of sea lice on Atlantic salmon farming operations in BC is less than on farming operations in other jurisdictions. Farmed Pacific salmon are also susceptible to sea lice but generally at lower levels. Concerns regarding the potential for sea lice from farmed salmon to impact the health of wild migratory salmon stocks led to the establishment of precautionary management thresholds. Licence holders must take action to reduce the absolute lice inventory at a farm if the sea lice abundance exceeds the threshold during the wild salmon out migration period (March 1-June 30). During the rest of the year, licence holders cultivating Atlantic salmon must provide DFO with a plan that describes how a reported threshold exceedance will be addressed.

Core Elements of an IPM for Aquaculture

The management of pests on farmed animals has evolved into comprehensive Integrated Pest Management (IPM) programs that minimize the effects of the pest through a combination of preventative and curative strategies. For salmon farming, IPM also needs to take into account the broad changes to the marine environment associated with global warming, the varied micro-

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

environments where salmon farms are located, the different times of year for treatments, and the different salmon sizes and life stages being treated.

The four core elements of IPM include prevention, monitoring, thresholds for management action, and a suite of readily available and effective management tools. For a more detailed description of the core elements, see Appendix C.

Prevention

Sea lice are naturally occurring and are present in the farming areas and on the wild fish in the areas. Prevention measures undertaken to manage the numbers of sea lice on farmed salmon include:

- Appropriate siting of salmon farms to manage sources and transmission of sea lice to farmed fish, to maintain water quality for stock husbandry, and to operate the site efficiently.
- Good husbandry practices to maintain the health of farmed fish include management activities; such as year class separation, fallowing, biofouling (organisms and shellfish attaching to infrastructure) removal, plankton bloom mitigation, nutrition management, predator control, and hygiene protocols.
- Strategic use of management tools such as site fallowing, area based management, and harvesting.
- Outside of BC, sea lice resistant fish stocks produced through selective breeding programs are used.

Monitoring

- Routine monitoring of sea lice numbers by fish health professionals and trained farm staff provide a site-specific picture of sea lice populations which enables proactive/optimal use of management tools throughout the production cycle.
- In the future, new sea lice treatments may also require corresponding changes to the monitoring approach.

Thresholds for Management Action

- Thresholds, established by DFO, identify when management actions are to be initiated.
- Thresholds must take into consideration environmental risks, potential for development of resistance with therapeutants, and the potential success of reducing the number of sea lice.

Suite of Management Tools

- Once a threshold has been met, sea lice management is initiated.
- Each situation is unique and requires a specific and unique management response and depending on the situation may require the use of more than one management tool.
- A clear decision framework ensures the appropriate tools are being used, taking into consideration environmental effects, efficacy of the tool, and regulations on the use of each tool.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Chemical Controls - Therapeutants include a variety of compounds used to treat sea lice on farmed salmon – topically and orally. See Table 3 for a list of therapeutants available globally and those currently in use in BC. These treatments have generally been adapted from drugs or pesticides used in terrestrial agricultural operations. Veterinary drugs and pest control products are regulated in Canada by Health Canada's Veterinary Drugs Directorate and Pest Management Regulatory agency respectively. In British Columbia, the use of pest control products also requires authorization from the provincial Ministry of Environment (typically a Pesticide Use Permit). Also, included in this group are vaccines and immunostimulants which are currently under research and development. Vaccines target developing an immunity to sea lice while immunostimulants target activating the immune system of fish to reduce incidence rates. In Canada, vaccines for animals are regulated by the Canadian Food Inspection Agency.

Physical Controls - Physical controls, such as structural barriers and/or physical mechanisms to block or remove sea lice from fish, are another key element of an IPM strategy. Control measures include lice skirts/filter tarps and mechanical removal. Other approaches are being developed and may be commercially available in the next five years. See Table 4 for a list of physical controls and strategies available for use globally and in BC.

Biological Controls - Biological controls include the use of other fish species that consume or 'clean' sea lice from farmed salmon. In Europe, cleaner fish have been proven effective in removing and controlling sea lice.

Moving an IPM Approach Forward

DFO and the BC salmon farmers recognize the importance of a comprehensive sea lice management approach and support the implementation of an IPM strategy. The following outlines activities that are required to implement this approach fully.

1. Expansion of Commercially Available Therapeutant Measures

In BC, two federally registered therapeutants are available: emamectin benzoate (SLICE®) which is available for use, and the topical product hydrogen peroxide (Interlox Paramove 50®). The latter requires additional Pesticide Use Permits issued from the BC Ministry of Environment for each production site/grouping, on a three-year basis. To date, very few sites have Pesticide Use Permits for hydrogen peroxide. It should be noted that therapeutants can only be used under specific fish husbandry and environmental conditions. For example, bath treatments such as hydrogen peroxide cannot be undertaken during periods of high water temperatures, low dissolved oxygen and/or plankton blooms.

Administrative challenges in registering and permitting pest control products has severely limited access to management tools available in other jurisdictions and hampers the development of a sea lice IPM for BC.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

The table below lists options available globally for sea lice management.

| Table 2 Sea lice Treatments Used Globally and Treatments Currently Used in BC | | | |
|--|------------------------|-------------------------------------|--|
| Product | Application Method | Status of Treatments: R&D or In Use | |
| | | British Columbia | Other Countries |
| Aqui-S (active ingredient eugenol) | Bath | NOT CURRENTLY AVAILABLE | In Use: New Zealand, Australia, USA, Chile, Norway |
| Ektobann/Calicide (active ingredient teflubenzuron) | In-feed | NO LONGER AVAILABLE | In Use: Ireland (partial), Norway, Eastern Canada, Faroe Islands |
| Excis/Betamax (active ingredient cypermethrin) | Bath | NOT CURRENTLY AVAILABLE | In Use: Chile, Ireland (partial), Scotland, Norway, Tasmania, USA, Tasmania, Eastern Canada, Faroe Islands |
| Alphamax (active ingredient deltamethrin) | Bath | NOT CURRENTLY AVAILABLE | In Use: Chile, Ireland (partial), Scotland, Norway, Tasmania, USA, Faroe Islands |
| Releeze (active ingredient diflubenzuron) | In feed | NOT CURRENTLY AVAILABLE | In Use: Chile, Norway, Tasmania, Faroe Islands |
| IMVIXA (lufenuron) | In feed for freshwater | NOT CURRENTLY AVAILABLE | In Use: Chile |
| Salmonsan (active ingredient azamethiphos) | Bath | NOT CURRENTLY AVAILABLE | In Use: Eastern Canada, Chile, Ireland (partial), Scotland, Norway, Tasmania, Faroe Islands |
| SLICE® (active ingredient emamectin benzoate) | In feed | IN USE | In Use: Canada, Chile, Ireland, Scotland, Norway, Tasmania, USA, Faroe Islands |
| Interlox Paramove 50 (active ingredient hydrogen peroxide) | Bath | IN USE AT PERMITTED SITES | In Use: Canada, Chile (partial), Ireland, Scotland, Norway, Tasmania, USA, Faroe Islands |

2. Research and Development of IPM Alternative Approaches and Strategies

IPM strategy is a commitment to continual improvement through the development and adoption of new technologies and state-of-the-art management processes for BC.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Research conducted in other areas has supported development of innovative methods to manage sea lice. The table below shows the variety of tools now available globally and the status of these tools in BC.

| Table 3 IPM Alternative Approaches and Strategies Under Development Globally and Status in BC | | | |
|--|-----------------------|---|--|
| Tool | Application Method | Status of Tools: Requires R&D or In Use | |
| | | British Columbia | Other Countries |
| Lice skirts | On site | R&D | In Use: Ireland, Scotland, Norway, Faroe Islands, Chile |
| Hydrolicer | Barge | R&D | In Use: Ireland, Scotland, Norway, Faroe Islands |
| Deep lights/deep feeding | On site | R&D | In Use: Scotland, Norway |
| Thermolicer/Optilicer | Barge/Boat | R&D | In Use: Scotland, Norway, Chile |
| Laser | Onsite | R&D | In Use: Scotland, Norway |
| Snorkel sea cages | On site | R&D | In Use: Norway |
| Fresh water | Well boat/On site | R&D | In Use: Norway, Ireland, Scotland |
| Immunostimulants | In feed | R&D | In Use Ireland, Scotland, Norway, Faroe Islands, Chile |
| Vaccines | Injected | R&D | R&D |
| Cleaner Fish | Co-culture | R&D | In Use: Ireland, Scotland, Faroe Islands, Norway, east coast of Canada |
| Resistant broodstock selection | Genetic mapping | R&D | In Use: Norway |
| Facility siting | On site | In Use | In Use: All |
| Dispersal models | Area Based Management | In Use for some sites | Under development in most jurisdictions |

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Long term successful research and development requires collaboration between the salmon farmers and federal and provincial governments to address all elements of moving an IPM forward.

- Industry led and funded research & development programs, such as the Marine Environmental Research Program.
- Financial support (government) to support preventative and curative management.
- Research facilities to undertake R&D.
- Regulatory support to pilot solutions in BC.

3. Pilot Testing of Innovative Measures

Solutions identified through research and development activities need to be further tested in a production setting to evaluate potential usefulness and to fine tune the technology or process to improve effectiveness. This requires government and industry support for pilot projects from both regulatory and financial perspectives. Funding programs targeting innovation and pre-commercialization pilot projects (e.g. DFO's Aquaculture Innovation and Market Access Program) are needed to transform valuable R&D concepts into commercially useful solutions.

4. Commercialization of New Tools

Financial support is essential to bridge the gap between R&D innovation and the commercialization of new tools. This support could be used to reduce development barriers such as scalability and marketing. As tools become commercialized, market pull has the potential to drive further innovation in BC. It also generates a healthy business environment with increased access to capital investment. This important feedback loop would ensure that BC salmon farmers are positioned at the forefront of ongoing development to ensure a long term successful IPM.

5. Fallowing, Year Class Separation, and Other Measures

Advancing the core element of prevention in an IPM for farmed salmon requires collaboration between the industry, federal and provincial governments for the following:

- Access to sites to enable fallowing and year class separation
- Greater flexibility around movement of existing farms and changes in production plans
- Deployment of alternate cage systems that increase water flow
- Research into impacts of global warming on both wild and farmed salmon including effect on phytoplankton
- Development and deployment of alternate plankton mitigation measures
- Commercial access to functional diets as they become available
- Research into improved predator deterrent systems
- Continued research into fish health improvements
- Continued research into native cleaner fish – identification of suitable species, research into rearing, husbandry, management and broodstock.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

6. Area Based Management

A sustainable IPM approach would include the principles of area based management using adaptive and risk-based responses to sea lice as a function of the presented risk to surrounding ecosystems. Effective area based management will incorporate environmental factors (e.g. temperature, salinity and dispersion) and company management objectives (e.g. number and location of farms, year class, number of fish stocked and distance between farms).

- Long term and coast wide real-time data to make effective management plans
- Wild fish data including migratory patterns and potential for interaction with farm fish; population dynamics including escapement, migrations, abundance; juvenile fish lice loads; other hosts
- Research and information on wild stock influences and environmental influences
- Local and coast wide environmental monitoring data including temperature, salinity, currents to make effective management decisions
- Research into hydrographic models to define new sites and zones for area based management
- Integrated pest management plans where salmon farms are in close proximity

Area based management goals are dependent on licence holders having access to multiple facilities to enable continuous production (e.g. year class separation) and further discussions on co-ordinating between different operators through groups such as the BCSFA are necessary.

Summary

DFO and the BC salmon farmers recognize the role of IPM to manage sea lice. An IPM strategy will help DFO meet management objectives for wild as well as farmed fish. IPM will also enable salmon farmers to manage pests for the best interest of animal welfare and productivity.

A successful IPM approach requires existing and new management tools for the BC salmon farmers. These include chemical, biological and physical strategies. In the future, new sea lice treatments may require corresponding changes to sea lice management and monitoring approaches.

Moving forward and developing a successful IPM for sea lice will require the following.

1. Additional treatments and methods made available for the salmon farmers in BC including tools used in other parts of the world.
2. Federal, provincial and salmon farmers-supported research programs that target innovative approaches to sea lice management.
3. Financial and regulatory support for the testing and implementation and commercialization of new and innovative tools.
4. Enabling policies and legislations to facilitate the use of new tools.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Appendix A Sea Lice Management for Atlantic Salmon Farms in BC

In British Columbia, DFO issues licenses for marine finfish aquaculture that include monitoring and intervention requirements at threshold limits for the number of sea lice on fish. For Atlantic salmon farms, licence holders must take action to reduce the absolute lice inventory at salmon farms if the sea lice abundance exceeds the threshold during the wild salmon out migration period. During the rest of the year, licence holders must provide DFO with a plan that describes how a reported threshold exceedance will be addressed.

Prior to 2002, sea lice infestations at BC salmon farms were not considered a significant concern. Treatments for sea lice infestations were rare and there was limited data recorded. In 2002, an unexpectedly low return of Pink salmon and growing concern about sea lice found on wild Atlantic salmon in Europe, led to reports in scientific journals and the print media suggesting that in BC sea lice from Atlantic salmon farms were negatively impacting juvenile wild Pink salmon, and in turn, affecting wild salmon returns.

In 2003, the provincial government, who was the regulator, initiated the Sea Lice Management Strategy that included sea lice monitoring systems and control measures on BC salmon farms. The strategy stipulated that during the period of juvenile Pink salmon migration out of the nearshore, from March through to the end of June, sea lice species *Lepeophtheirus salmonis* were to be maintained below three motile (i.e. having the power to move spontaneously) lice per fish. If levels exceeded this threshold during this three-month period, the fish were to be treated or harvested. Management options during the remainder of the year were at the discretion of the license holder.

The sea lice threshold was selected by government and salmon farmers as a level that would allow precautionary management while scientific data was gathered to better determine the relationship between sea lice on wild and farmed fish.

It was also acknowledged that there was a lack of serious effects of sea lice on BC farmed salmon compared to other global jurisdictions due to genetic difference in the sea lice species. Further, that the large populations of wild salmon in BC are known to carry sea lice and contribute to sea lice abundance on farmed salmon particularly during the summer and fall migration period.

In 2010, DFO assumed regulatory responsibility for aquaculture activities in British Columbia. Threshold levels, monitoring and audit programs remained similar to those used by the provincial government with the exception that licence holders were required to report sea lice levels directly to DFO.

In the 2016 BCSFA Sustainability Progress Report, the BC salmon farmers re-iterated the commitment to sea lice management through an IPM strategy to meet the required standards of both governmental regulators and third-party certification bodies, such as the Global Aquaculture Alliance's Best Aquaculture Practises certification and Aquaculture Stewardship Council's certification.

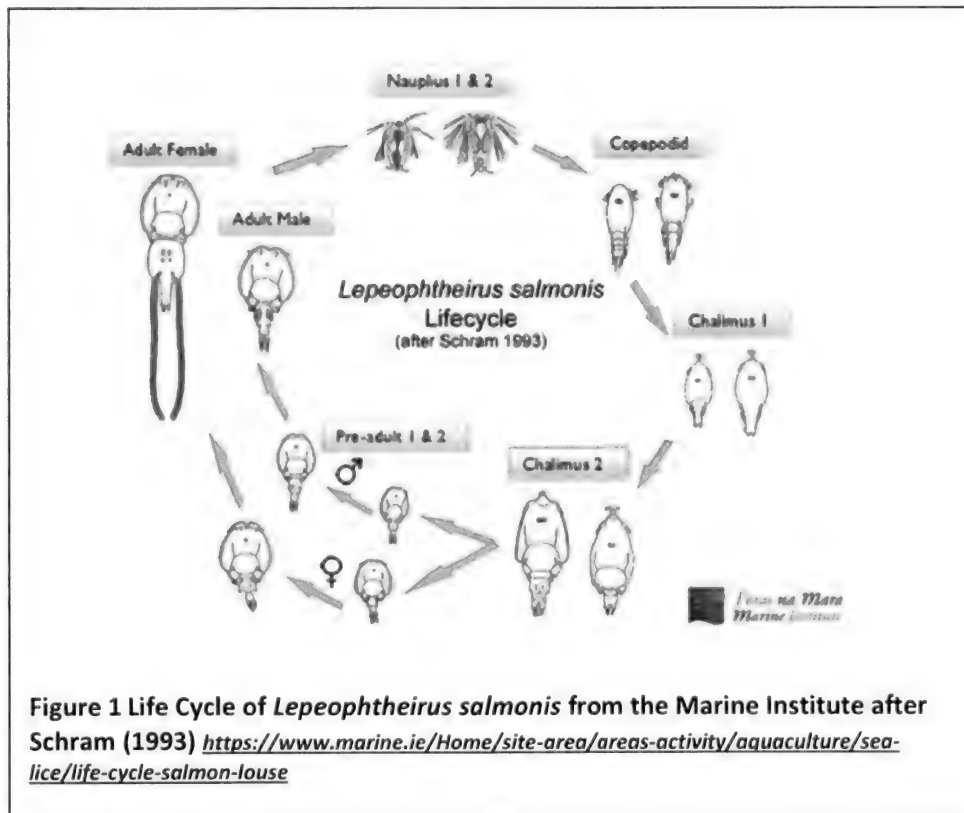
Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Appendix B Sea Lice Biology

Life Cycle and Distribution

Sea lice are naturally occurring parasites that reside on the bodies of both wild and farmed fish. They attach themselves to the skin, fins, and gills of fish and feed on mucus and skin. The term “sea lice” refers to several life stages and species of parasitic copepods. For salmon farm sea lice management in British Columbia, there are two main species of interest – *Lepeophtheirus salmonis* and *Caligus clemensi*.

Sea lice life history is broadly divided into free-living and parasitic phases. The copepodid stage is the most common stage that infects salmon although some transfer of pre-adult and adult stages does occur between fish. Water temperature, salinity and water movement (from tides and currents) are the major physical and environmental factors influencing sea lice dynamics. Temperature and salinity influence sea lice development, growth, survival and reproduction rate. Currents and water column mixing processes influence the transport and dispersal of the free-living stages of sea lice (nauplius and copepodid stages).



Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Sea lice distribution and prevalence varies seasonally, annually and regionally on both farmed and wild fish. The influence of wild fish as sea lice hosts is well documented. In the Broughton Archipelago, the number of returning Pink salmon is a key factor to predict the number of sea lice on farmed salmon for the following spring.

Hosts and Host Susceptibility

Host susceptibility, the host being a wild fish or farmed fish, varies between fish species. Host response, damage to the host, and the quantity of wild hosts in the ecosystem all affect the number of sea lice on farmed salmon.

There is a wide range of susceptibilities to infestation with *L. salmonis* sea lice on Pacific salmon. The abundance of sea lice on Pacific salmon is influenced by many factors, including:

- species of salmon;
- the age of the salmon;
- its length of time in seawater;
- by sea lice location and season;
- the proximity of the host fish to sources of sea lice;
- the application of sea lice treatments on farmed fish; and
- by numerous other environmental factors affecting both the sea lice and the wild fish or farmed fish host.

Farmed Atlantic salmon are transferred from freshwater hatcheries to ocean net pens free of sea lice. In the ocean, farmed salmon are exposed to sea lice from a variety of sources, particularly wild salmon returning to their spawning grounds. Atlantic salmon are more susceptible to sea lice infestation than the various species of Pacific salmon. Atlantic salmon would be the most likely salmonid to have *L. salmonis* sea lice and the least likely to shed them naturally. Despite this susceptibility, no harm to Atlantic salmon stocks at farm sites has been observed in BC.

Non-salmonid species also host sea lice and are potential reservoirs for the transfer of sea lice to both wild and farmed salmon. Many species of marine fish (herring, stickleback, rockfish, greenling, ratfish, sand lance, lingcod and Pollock) are known to host *Caligus species*. Similarly, *L. salmonis* occur on Pacific sand lance, lingcod, three-spine stickleback and white sturgeon. The duration and intensity of sea lice vary by species, location and among year classes of the host fish.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Appendix C Detailed Elements of an IPM Strategy for Sea Lice

Prevention - Facility Siting

At least initially, sea lice infestations are predominantly derived from wild hosts in the area and from sea lice drifting into the area on prevailing currents. Siting farms away from locations where wild salmon are known to concentrate (e.g. salmon bearing rivers/streams and estuarine holding areas), can be useful in reducing the number of sea lice on farmed fish.

Characteristics such as water depth, tidal range, currents and sea bottom types are considered by both salmon farmers and regulators in siting assessments as they influence the environmental sustainability of the farm. In particular, good water flow can prevent build-up of sea lice larvae at a site and can contribute to the dispersion of therapeutants following a treatment.

The distance between farms is a provincial and federal requirement. Spacing between farms can reduce the transmission of sea lice between farms. Facilities operating on a common or shared production cycle within a defined area can also co-ordinate treatments on an area-based level.

Prevention - Husbandry

Good husbandry practices are an important and key aspect of sea lice management and prevention. Maintaining the health of farmed fish and mitigating potential risks from interactions between farmed and wild stocks are integral components of the salmon farmer's mandatory Health Management Program (HMP). This is achieved through a number of management activities as described below.

Year Class Separation

Year class separation is considered one of the most effective IPM-related husbandry techniques, with production sites stocked as a single year class and an all-in/all-out harvest policy. Juveniles are not introduced into facilities where older fish are already at the farm. This reduces juvenile salmon exposure to sea lice from older fish. Where year class separation is not feasible, treating salmon already on the farm will reduce lice numbers before introducing new fish.

Biofouling Removal

Routine in-situ net cleaning ensures the water flow through the site is optimized, reducing stress and improving the general health of farmed salmon.

Plankton Blooms Management

Plankton management indirectly mitigates the risks associated with sea lice by reducing stress on the salmon and improving fish health. Activities may include a HAMP (Harmful Algal Monitoring Program) and plankton mitigation measures such as deployment of bubble walls, tarpaulin skirts and aeration.

Nutrition Management

Maintaining fish health increases the efficacy of sea lice treatments and the opportunities for applying other types of sea lice management. This includes the use of high quality feed and feeding management integrated with fish health support.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Predator Control Management

Predators are stressful for farmed fish with related risks to fish health. Predator control measures (e.g. deployment of bird nets, shark guards, full predator nets) reduces the potential stress.

Hygiene Protocols

Farm operational hygiene within the operator's comprehensive Fish Health Management Plan is required for all licenced facilities. This includes daily removal of mortalities, regular cleaning of equipment, limiting visitors, and restricting extensive movements of equipment.

Prevention – Resistant Broodstock Selection

Internationally, commercial fish breeding programs are developing 'sea lice resistant' stocks. Currently, there are no commercial breeding companies working in BC. Individual farming companies do have breeding programs, but selection for sea lice resistance has not occurred.

The scale of the BC salmon farming has been a limitation to attracting innovation and investment. Currently there are only a few small local facilities to support sea lice challenges and genetic testing in BC. Support for larger institutes and existing facilities, such as the BC Centre for Aquatic Health Sciences, to provide these services, is key to developing the suite of tools necessary for and Integrated Pest Management system.

Monitoring and Identification

Decisions on when to conduct a sea lice treatment at a farm are based on the results from a program of routine monitoring of sea lice numbers, managed by the operator's fish health professionals. Monitoring is conducted continuously following the transfer of juveniles from hatchery through to harvest. Fish health staff evaluate sea lice populations and develop assessments and optimal management practises. IPM-linked activities include routine monitoring, training staff on sea lice identification, and reporting sea lice abundance at the facility.

Thresholds for Action

Thresholds of the number of sea lice that trigger treatment, are determined by accounting for potential risks of the sea lice becoming resistant to treatment, the operator's obligation to safeguard the farmed salmon, and ability to reduce the real or perceived risks associated with the transfer of sea lice from farmed fish to wild fish.

A threshold that is too low can lead to unnecessary treatments which can accelerate the development of sea lice resistance.

Current regulatory thresholds in BC set out in DFO's conditions of licence are as follows:

- Calendar year March 1 to June 30: if the sea lice count exceeds 3 motile lice (*Lepeophtheirus salmonis*) per fish the operator will implement a plan to reduce absolute sea lice inventory within 15 days.

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

- July 1 to February 28: if the sea lice count exceeds 3 motile lice (*Lepeophtheirus salmonis*) per fish then the operator will provide a plan to DFO to address this within 30 days.

Control Measures

Biological

The use of cleaner fish, such as wrasse or lumpsuckers, to remove sea lice from salmon has shown promising results in Norway and Scotland. BC's salmon farmers are currently supporting research under the Marine Environmental Research Program (MERP) to identify potential local species that may act as cleaner fish to remove sea lice from farmed salmon in BC. A BC Salmon Farmers Association group is also working with DFO to determine the regulations and protocols required around various options for the use of biological measures.

Therapeutants

In BC, there are two fully registered therapeutants available.

SLICE® became available for veterinarians to administer under special permit, Emergency Drug Release or EDR, obtained from Health Canada in 1999 and gained full registration approval in 2000. Until 2013, SLICE® was the only therapeutant used for sea lice in British Columbia.

BC's salmon farmers are concerned about the inherent limitation of having only one sea lice treatment product available. This situation differs from other agricultural practices which utilize a rotation of treatments as part of an integrated pest management program to increase effectiveness and prevent or delay development of resistance to treatments.

Interlox Paramove 50® became available for use under an Emergency Use Registration label in October 2013 and received full registration in March 2015. However, applications are limited as environmental conditions can prevent the use of Paramove 50®. During plankton blooms and during certain periods, SLICE® is the sole therapeutic treatment option. BC's Ministry of Environment requires application for a Pesticide Use Permit prior permission for the use of Interlox Paramove 50® at salmon farms.

Vaccines and Immunostimulants

Vaccines and immunostimulants, or functional feeds, are potential tools for sea lice control. These products are currently under development.

Others

Non-therapeutic control measures such as tarps, lice skirts, mechanical removal and freshwater bathing are being investigated by BC operators. Methodologies are still being refined as physical controls can be stressful for the farmed salmon and removal efficacy varied. Further research is required to determine how these methods will be used in BC.

Examples of new types of treatments are:

- Thermolicer, (<http://www.steinsvik.no/en/products/e/seaculture/fish-health/thermolicer>);

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

- Hydrolicer (<http://www.fishfarmingexpert.com/news/hydrolicer-unveiled/>)

Freshwater treatments have also been trialed but require significant infrastructure as the treatments are seven hours in duration.

Other approaches are still under development and may be commercially available in the next five years, including the Snorkel lice barrier system and Stingray delousing.

(['Snorkel' sea lice barrier technology reduces sea lice loads on harvest-sized Atlantic salmon with minimal welfare impacts](https://www.researchgate.net/publication/294579093)),
(<http://en.stingray.no/>)

Integrated Pest Management Approach to Sea Lice Management for BC Atlantic Salmon Aquaculture Facilities

Appendix D Bibliography

The following list of references and materials were used during the development of this document.

Health Canada – Integrated Pest Management of Sea Lice in Salmon Aquaculture
(<http://publications.gc.ca/collections/Collection/H114-9-2003E.pdf>)

Lepeophtheirus salmonis: a persisting challenge for salmon aquaculture (doi:10.2527/af.2014-0004)

A SUMMARY OF SEA LICE IN BC – WILD AND FARMED MONITORING AND MANAGEMENT Saksida 2015

Detection of emamectin benzoate tolerance emergence in different life stages of sea lice,
Lepeophtheirus salmonis, on farmed Atlantic salmon, *Salmo salar* L. P G Jones et al 2013 doi:10.1111/jfd.12022

Integrated Pest Management of Sea Lice in Salmon Aquaculture – Myron Roth presentation Speaking for
the Salmon - <https://www.sfu.ca/cstudies/science/resources/1273698226.pdf>

Wilkinson, Davida

From: Waddington, Zac
Sent: Tuesday, June 11, 2019 5:29 PM
To: Price, Derek; Manchester, Howie; Metcalf, Vanessa; Taekema, Bernie John; Paylor, Adrienne; McConnachie, Sarah; Sandberg, Krista
Subject: Sea lice CoL
Attachments: Amendments to sea lice COLs-April 9-ZW edits.docx

Please see the attached with my edits.

All-in-all I think the new CoL's are excellent and I really appreciate everyone's work! I'll be in the office in the morning tomorrow so I'll see at least some of you guys then,

Dr. Zac Waddington DVM, B.Env.Sc.(Hons)
Lead Veterinarian - Pacific Region
Fisheries and Oceans Canada | Pêches et Océans Canada
Aquaculture Environmental Operations - Fish Health
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Pages 478 to / à 480
are withheld pursuant to sections
sont retenues en vertu des articles

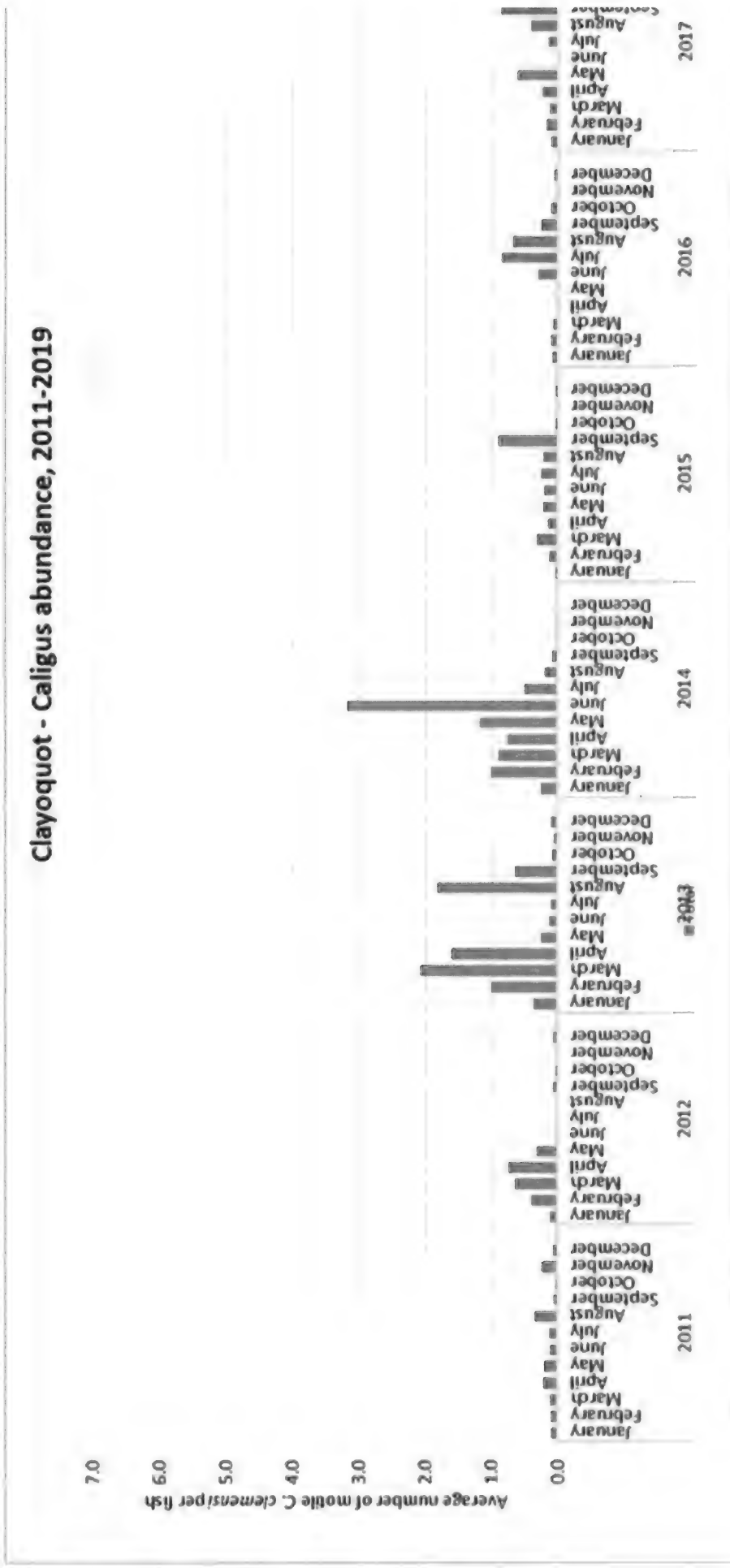
21(1)(b), 21(1)(a)

of the Access to Information Act
de la Loi sur l'accès à l'information

Wilkinson, Davida

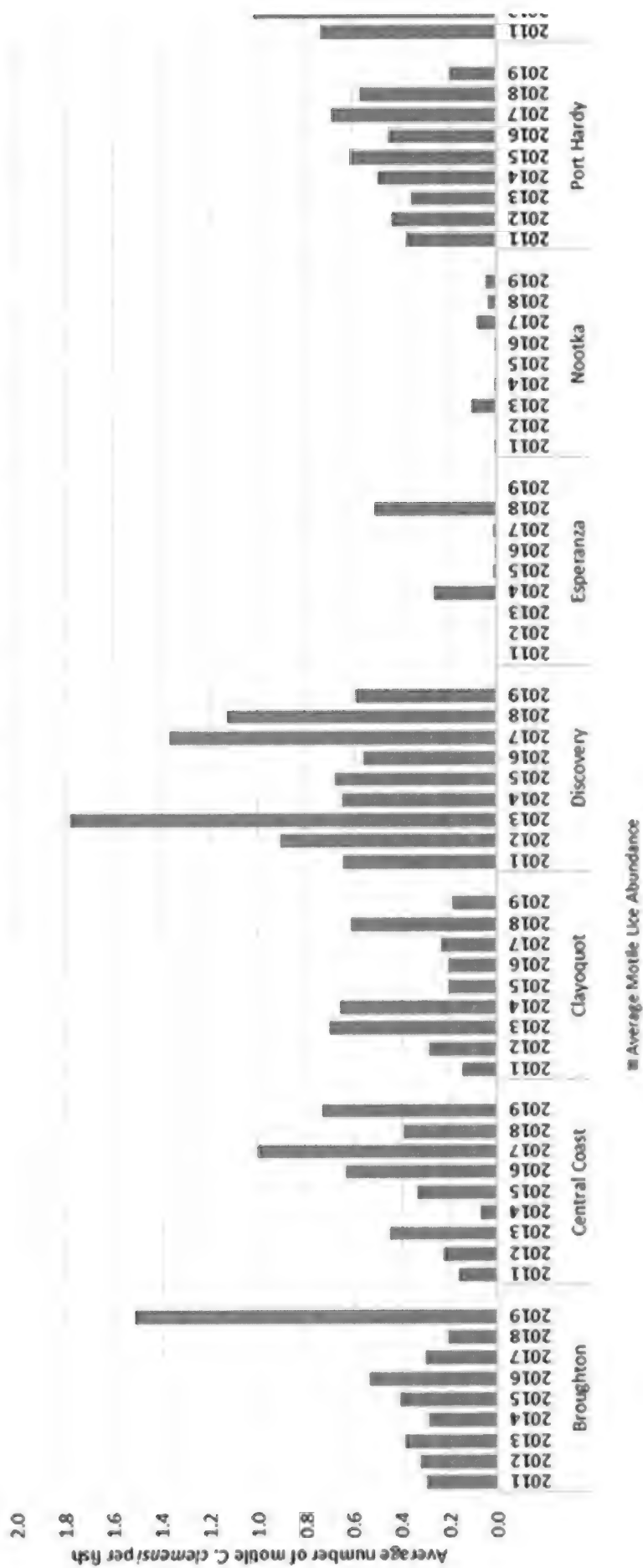
From: Sandberg, Krista
Sent: Wednesday, June 19, 2019 9:41 AM
To: Paylor, Adrienne; McConnachie, Sarah
Subject: RE: Science questions for PARR

Yes, this is Caligus but it is an average for the outmigration period each year and the spike in Tofino happened after the outmigration. Here is Tofino for each year showing the spike:



Also annual averages for each zone:

Average annual Caligus abundance, 2011-2019



Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
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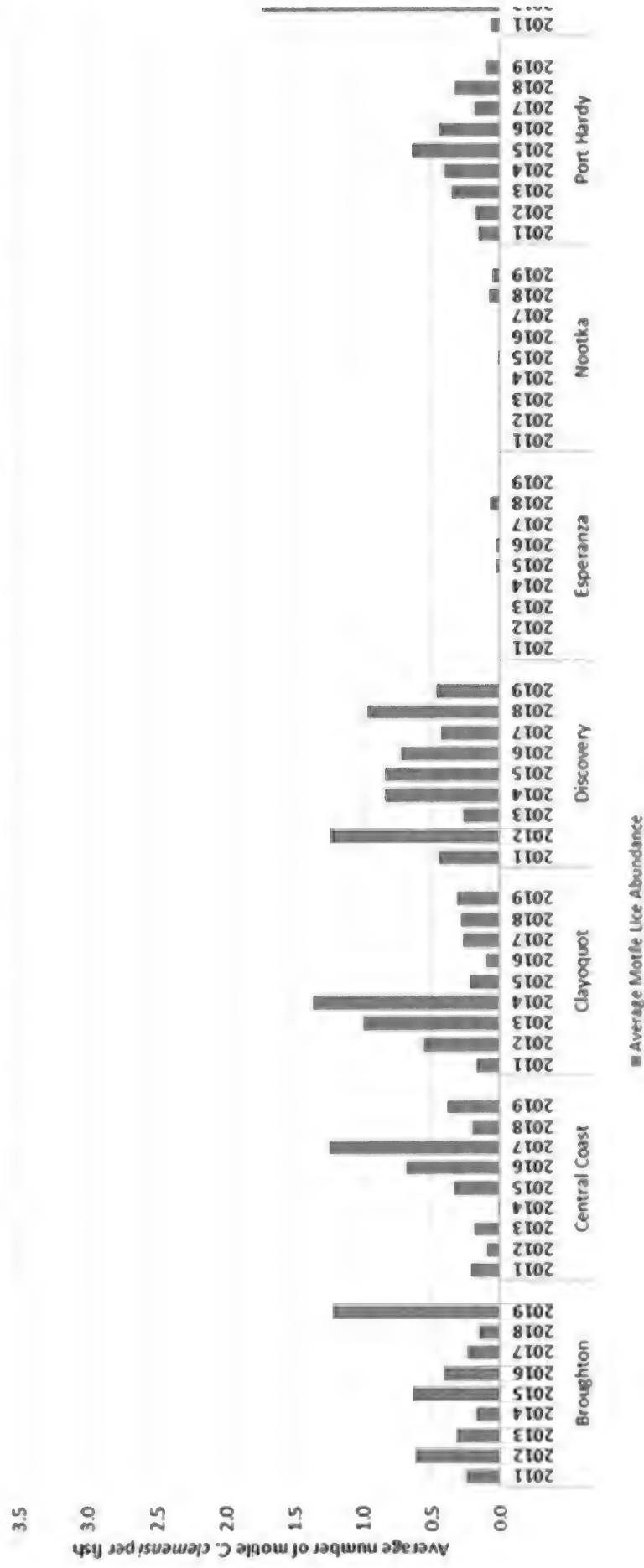
s.16(2)(c)

From: Paylor, Adrienne
Sent: June-19-19 9:31 AM
To: Sandberg, Krista; McConnachie, Sarah
Subject: RE: Science questions for PARR

Wow so interesting....so this is herring lice not Lep's right? Looks pretty low. Where was the farm that did the cull last year?

From: Sandberg, Krista
Sent: June-19-19 9:25 AM
To: McConnachie, Sarah; Paylor, Adrienne
Subject: RE: Science questions for PARR

Average Sea Lice Abundance during juvenile salmon outmigration (March-June) - 2011-2019



Krista Sandberg
Aquaculture Data and Public Reporting Coordinator |
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s.16(2)(c)

From: McConnachie, Sarah
Sent: June-18-19 11:38 AM
To: Paylor, Adrienne
Cc: Sandberg, Krista
Subject: RE: Science questions for PARR

Done – he will put together a short summary. For Krista I would say just a similar graph to her monthly reports (e.g., by area and year). Derek can do overall trends etc

From: Paylor, Adrienne
Sent: June-18-19 11:21 AM
To: McConnachie, Sarah
Subject: RE: Science questions for PARR

Or talk to Derek and see what he thinks we should look at before we make Krista work on anything.....you and Derek may have a better idea of what we should look at???

From: McConnachie, Sarah
Sent: June-18-19 11:18 AM
To: Paylor, Adrienne
Subject: RE: Science questions for PARR

Okay – I will wait to see what Krista has before I bother Derek

From: Paylor, Adrienne
Sent: June-18-19 11:00 AM
To: McConnachie, Sarah
Subject: RE: Science questions for PARR

Here is the last formal request form for Science advice that we need to update for management. Krista said she could compile the herring lice data for us so maybe touch base with her and make sure Derek and Krista aren't doing the something ☺ Thx

From: McConnachie, Sarah
Sent: June-18-19 10:46 AM
To: Paylor, Adrienne
Subject: FW: Science questions for PARR

From: McConnachie, Sarah
Sent: June-13-19 12:33 PM
To: Paylor, Adrienne
Cc: Webb, Allison
Subject: RE: Science questions for PARR

Hey Adrienne,

As per our conversation yesterday regarding streamlining a Science question, I've come up with the following. Remember that we decided it would be best to put this forward for CSAS (advice) rather than PARR (research study):

"In the context of Area Based Management and utilizing FVCOM modelling, can we group farms into 'Bay Management Areas' that will be similarly affected by sea lice particle movement?"

The regulatory need is that we want the ability to have ABM of farms and to be able to mitigate those farm effects on the local ecosystem. Once we identify groups of farms that are similarly affected by the same outbreak of sea lice, we will be able to manage those farms as a single entity (require all-in, all-out, single year class stocking, coordinated treatments, etc).

Dr. Sarah McConnachie MSc, PhD, DVM
Field Operations Veterinarian - Pacific Region
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Sarah.McConnachie@dfo-mpo.gc.ca

s.16(2)(c)



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of Canada

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From: Paylor, Adrienne
Sent: June-06-19 1:02 PM
To: McConnachie, Sarah
Subject: FW: Science questions for PARR

Hi Sarah,

The last I could find of the sea lice CSAS questions were being worked out by Zac and Simon below. See attached to see if this still makes sense. We also had Raju from CFIA look at some risk factors for us that we may want to find in prep for more sea lice analysis?

From: Waddington, Zac
Sent: February-19-18 2:23 PM
To: Chamberlain, Jon; Jones, Simon; Taylor, Nathan
Cc: Paylor, Adrienne
Subject: Science questions for PARR

Sorry for the delay in this email, [REDACTED] immediately following the PARR science meeting in Ottawa. I just wanted to ensure that when/if funding arrives to BC from Ottawa that the questions to be addressed by DFO science are well understood. The DECK presented at the Ottawa meeting had some older versions of our sea lice questions in particular. Please see the attached document which has the most recent iteration of our questions relating to area-based management (specific to hydrology) and sea lice regulatory thresholds.

I am open to further refinement of these questions are you see fit. Please feel free to distribute to whomever as you see fit (i.e. John Martell and Jay Parsons).

Dr. Zac Waddington DVM, B.Env.Sc.(Hons)
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Zac.Waddington@dfo-mpo.gc.ca

s.19(1)

Wilkinson, Davida

From: Paylor, Adrienne
Sent: Thursday, June 20, 2019 10:00 AM
To: Keith, Ian
Subject: Are you around or in town [REDACTED]

Hi Ian,

[REDACTED] I'm just wondering if you might be working out of Comox this afternoon or tomorrow (this Friday)? Would love to pick your brain a bit about sea lice and just catch up in general. No worries if you are busy we will catch up soon at some point I'm sure 😊

Adrienne Paylor

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Government of Canada | Gouvernement du Canada

s.19(1)

Wilkinson, Davida

From: Sandberg, Krista
Sent: Monday, June 24, 2019 10:25 AM
To: Taekema, Bernie John; Paylor, Adrienne; Price, Derek; McConnachie, Sarah; Manchester, Howie; Metcalf, Vanessa; Zac Waddington [REDACTED]
Cc: Shaw, Kerra
Subject: RE: Amendments to sea lice COLs-April 9

Sorry that I've been a bit disengaged on this one...finally catching up on my emails from a few weeks ago! If you have a meeting about this soon, I would be interested in taking part and definitely need to sit down and contemplate the reporting changes that these amendments will require. As you know, we have no development funding for AQUIS this year, and if we are opening COLs [REDACTED] we will definitely need to consider this. I'm not saying that this speed bump should change our regulatory decisions in any way, but I would like to know what changes to anticipate prior to them being implemented. It may be that we need to request a new project and funding to amend our database to capture the reporting changes.

Cheers,
Krista.

Krista Sandberg

Aquaculture Data and Public Reporting Coordinator |
Coordonnateur des données sur l'aquaculture et des rapports publics
Office | Bureau 250-286-5835
Cellular | Cellulaire [REDACTED]



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From: Taekema, Bernie John
Sent: June-11-19 1:30 PM
To: Paylor, Adrienne; Price, Derek; McConnachie, Sarah; Manchester, Howie; Metcalf, Vanessa; Zac Waddington (zwaddington@gmail.com)
Cc: Shaw, Kerra; Sandberg, Krista
Subject: RE: Amendments to sea lice COLs-April 9

s.16(2)(c)
s.19(1)
s.21(1)(a)
s.21(1)(b)

Thank you all for work on this.

I ran into Simon Jones [REDACTED] and he is keen to be engaged in assisting in the review of these proposed conditions. I mentioned to him that we would certainly engage him in an upcoming meeting.

Should we have another meeting on this in the next few weeks? Would the beginning of July work?

Bernie

From: Paylor, Adrienne
Sent: June-11-19 12:23 PM
To: Price, Derek; McConnachie, Sarah; Manchester, Howie; Taekema, Bernie John; Metcalf, Vanessa; Zac Waddington ([REDACTED])
Cc: Shaw, Kerra; Sandberg, Krista
Subject: Amendments to sea lice COLs-April 9

This is where everyone got today on the next version of these COL.

Note that some work may be needed on the definitions and maybe one appendix we made up (to check with Krista on this) – we didn't work on that today 😊

Kadrienne

No information has been removed or severed from this page

Wilkinson, Davida

From: Keith, Ian
Sent: Monday, June 24, 2019 2:02 PM
To: Paylor, Adrienne
Subject: graph by Simon
Attachments: infection threshold in the wild.pdf

Hi Adrienne,

I don't know if Simon will include this figure in his presentation, but abundance of female lice on Atlantic salmon in the Broughton 2004-2015, for January, February, March and April, superimposed with pink salmon escapement, shows that with the 3 motile threshold, farmers are able to stay below threshold and manage burdens during outmigration for all but the exceptional years. The huge pink returns i.e. Fall 2003 and Fall 2014, are anomalous years. If Simon has 2016, 2017, 2018 Broughton data to add to this i.e. pink data and female lice levels, then this is a robust test of the threshold allowing sustainable lice management.

Regulatory medicine is supposed to be conservative, and to change a management threshold requires compelling evidence

X:\AEO\Courtenay\FH\Sea lice files\Jones presentations\broughton sea lice 2015.pptx

For the fate of the wild smolts, the attached file, Jones and Hargraves (2009), use their lethal challenge level from the lab to estimate the proportion of the pink smolts in the Broughton that would receive sufficient intensity of challenge to be lethal.

This isn't comprehensive, but you could say that Nathan is maintaining the chum monitoring program on the west coast (no pinks on the west coast and chum are also small as smolts) and whatever monitoring is occurring by industry.

Ian Keith
A/Fish Health Veterinarian
Fisheries and Oceans | Salmonid Enhancement Program
3190 Hammond Bay Road, Nanaimo, BC V9T 6N7
Phone: 250-898-3377 | Fax: 250-729-8377

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| Vol. 84: 131–137, 2009 doi: 10.3354/dao02043 | DISEASES OF AQUATIC ORGANISMS Dis Aquat Org | Published April 6 |
|---|--|-------------------|

Infection threshold to estimate *Lepeophtheirus salmonis*-associated mortality among juvenile pink salmon

Simon R. M. Jones*, N. Brent Hargreaves

Pacific Biological Station, Fisheries and Oceans Canada, 3190 Hammond Bay Road, Nanaimo,
British Columbia V9T 6N7, Canada

ABSTRACT: A threshold of lethal infection was estimated from previous controlled laboratory exposures to be 7.5 *Lepeophtheirus salmonis* g⁻¹ for pink salmon *Oncorhynchus gorbuscha* averaging <0.7 g. This threshold was used to assess the risk of mortality caused by *L. salmonis* among pink salmon of the same size class in the Broughton Archipelago, Canada from 2005 to 2008. Virtually all (≥98.9%) pink salmon collected in late March belonged to this size class, and this proportion declined to ≤1% by early July. The proportion of these small pink salmon with infections equal to or exceeding the threshold declined from 4.5 in 2005 to 0% in 2008, coincident with an overall decline in parasite prevalence and intensity during this period. In 2005 and 2006, this proportion was greatest in March (7.8 and 1.1%, respectively) whereas in 2007, the proportion exceeding the threshold was greatest in May (2.9%). In 2008, no infections exceeded the threshold. Parasite development coincided with fish migration through the study area. The declining risk between 2005 and 2008 was possibly related to changes in ocean conditions such as temperature, to changing treatment practices for this parasite on salmon farms, or to changes in the abundance or distribution of non-farmed hosts. The concept of a threshold of *L. salmonis* infection density may be used to assist in the management and conservation of juvenile pink salmon in the Broughton Archipelago region.

KEY WORDS: *Lepeophtheirus salmonis* · Juvenile pink salmon · Infection density · Laboratory · Surveillance

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INTRODUCTION

The salmon louse *Lepeophtheirus salmonis* is a parasite of marine salmonids throughout the northern hemisphere (Pike & Wadsworth 1999). Infections are initiated when the free-swimming copepodid settles onto the host and moults through 4 chalimus stages that are each attached via a frontal filament. Subsequent pre-adult and adult parasitic stages no longer possess the filament and are motile on the host. Damage caused by the parasite results from physical attachment to the host and from feeding on host mucus, skin and blood (Costello 2006). While the importance of host age or size in influencing the outcome of infections has been recognised (Pike & Wadsworth 1999, Johnson et al. 2004), there has been very little research in this area. Pink salmon *Oncorhynchus gorbuscha* migrate to the

ocean immediately after emerging from gravel spawning beds and may be exposed to the parasite while as small as ~0.3 g. The risk to these post-emergent pink salmon represented by this early exposure remains poorly quantified.

The relationship between the size of juvenile pink salmon and susceptibility to *Lepeophtheirus salmonis* has been explored in controlled laboratory studies. The parasite is rapidly rejected from pink salmon ranging from 3 to 20 g, and these fish avoid the clinical consequences of infection (Jones et al. 2006a, 2007). This defence mechanism is associated with the expression of pro-inflammatory genes in the skin and head kidney, and functions despite feed deprivation (Jones et al. 2007, 2008a). Thus, competent pink salmon possess an effective innate immunity and are at little risk of infection from exposure. However, a more recent study

*Email: simon.jones@dfo-mpo.gc.ca

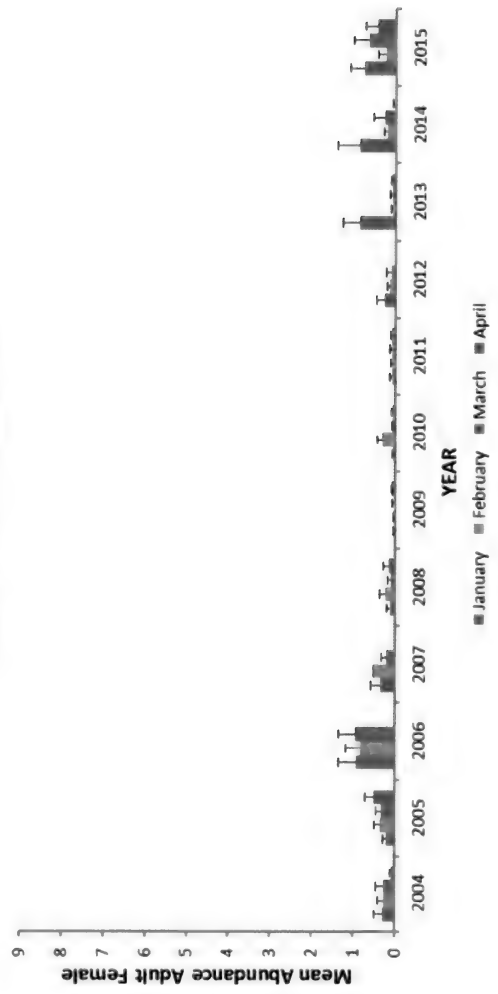
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are withheld pursuant to section
sont retenues en vertu de l'article**

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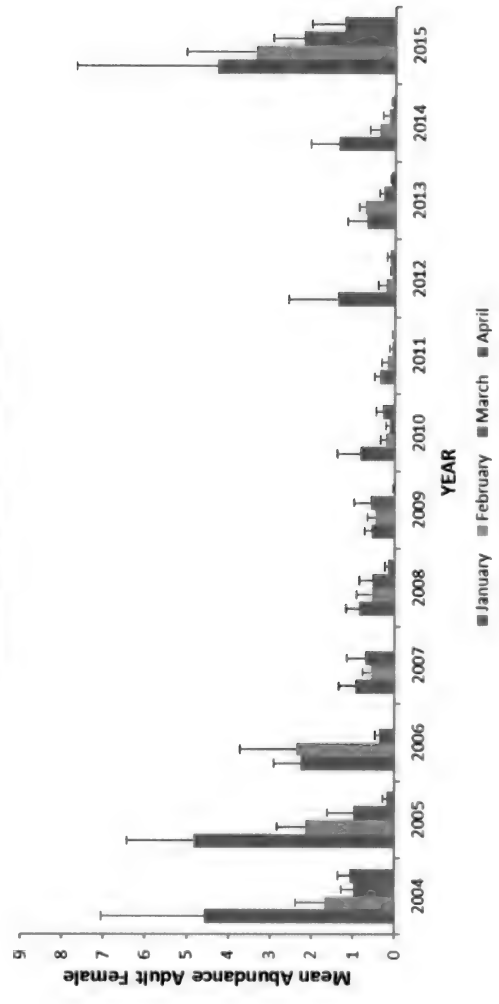
**of the Access to Information Act
de la Loi sur l'accès à l'information**

Adult female *L. salmonis* on Atlantic salmon in the Broughton Archipelago

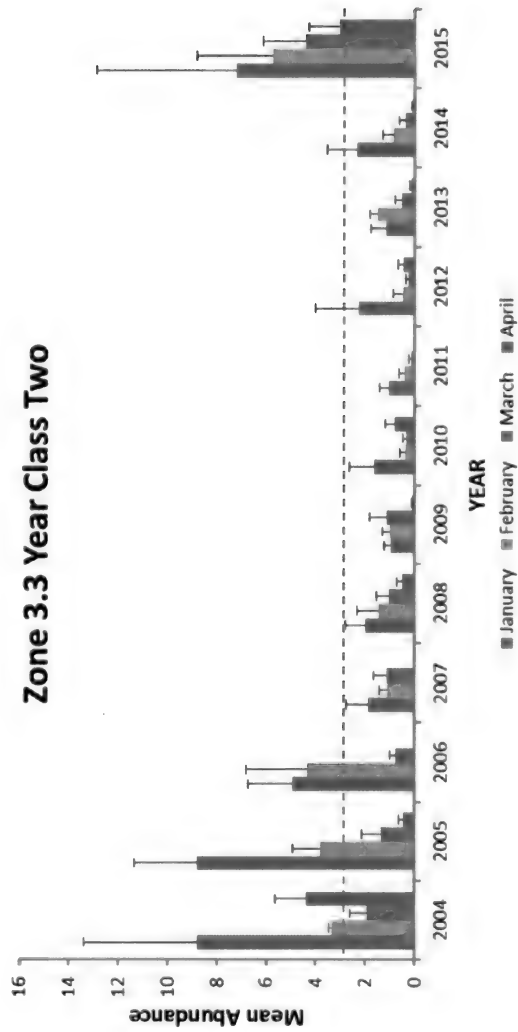
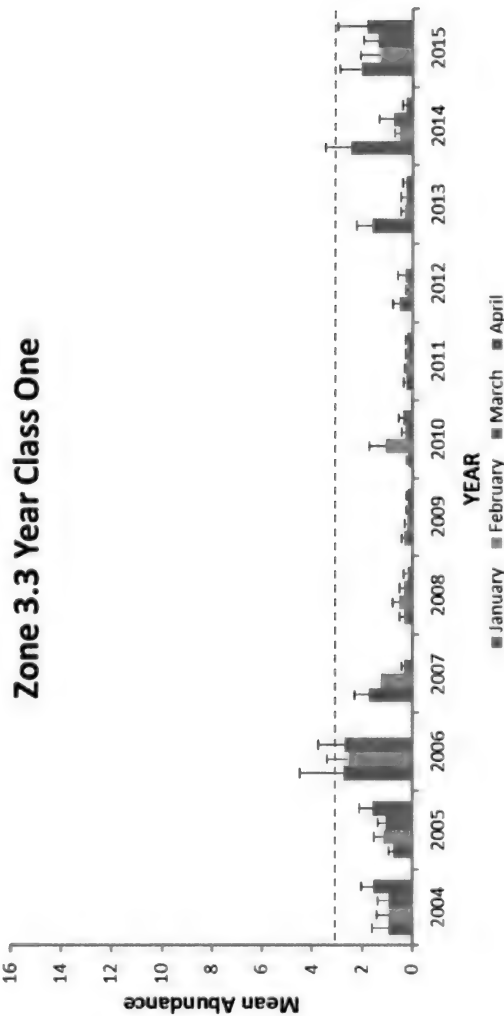
Zone 3.3 Year Class One



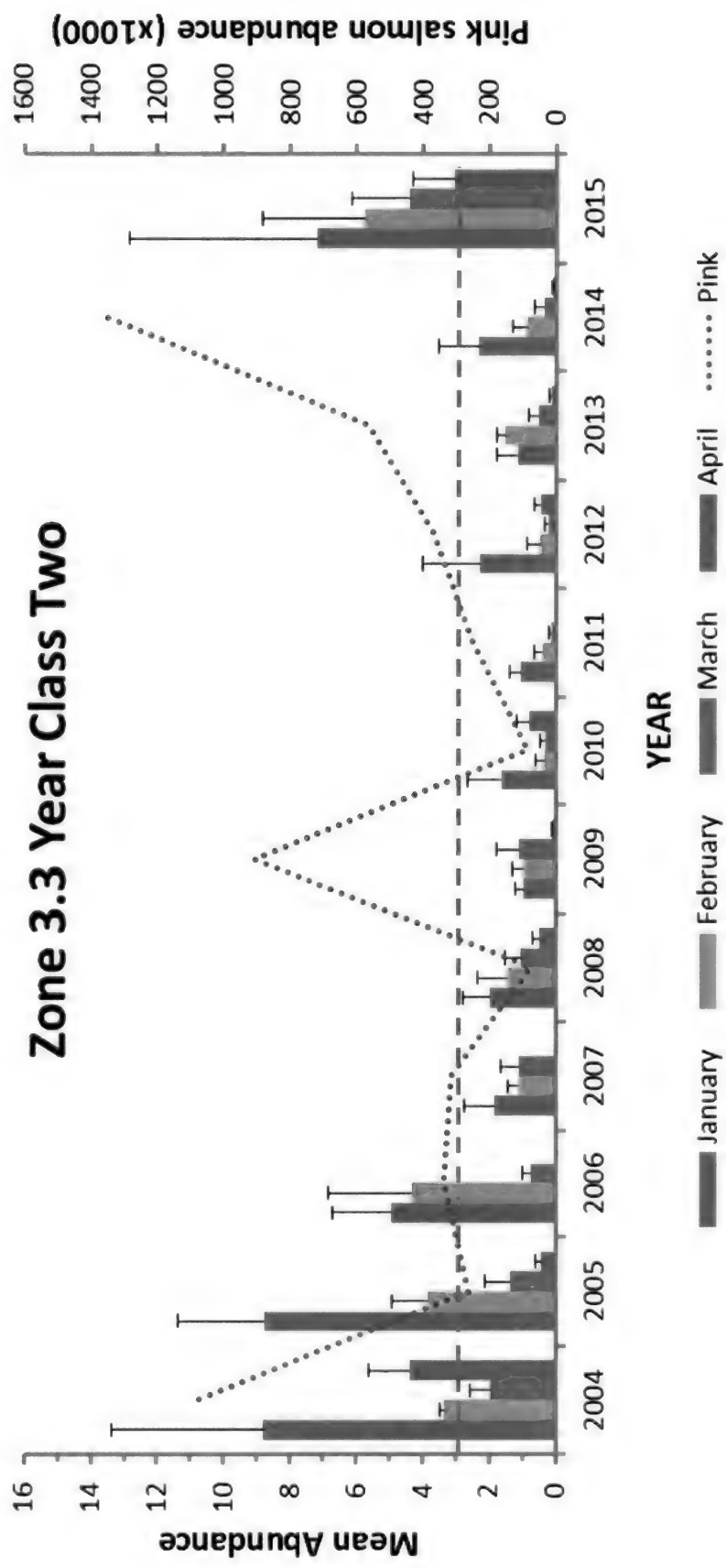
Zone 3.3 Year Class Two



Motile *L. salmonis* on Atlantic salmon in the Broughton Archipelago



Motile *L. salmonis* on Atlantic salmon in the Broughton Archipelago, with annual pink salmon escapement estimates



Wilkinson, Davida

From: Keith, Ian
Sent: Tuesday, June 25, 2019 12:41 PM
To: Paylor, Adrienne
Subject: FW: graph by Simon
Attachments: Messmer et al 2018.pdf

Hi Adrienne,
In speaking with Simon this morning I realise that I have confused your meetings.
Simon will not be presenting at the meeting tomorrow but will be present to weigh in.

Simon's graph does defend our regulatory threshold is Simon's perspective too. These data X:\AEO\Courtenay\FH\Sea lice files\Jones presentations\broughton sea lice 2015.pptx are only from Broughton but this is because we have most complete data from this area. You should ask [REDACTED] if he could extend data from 2016-2018 for next week's meeting to show the low abundance returning. Simon says there is weakness in the wild sample component of the dataset – what is necessary is a systematic sampling program of wild fish to generate robust data. (Simon's 2009 paper above is a best estimate of how many pink salmon of vulnerable size would pass through the fish farm plumes of lice, but his best estimate is not as robust as the farm data.)

Simon would add that despite the high lice abundance on farms in 2004 – 2006, the pink returns from 2006-2008 were high and healthy.

For your meeting tomorrow Simon's graph is still the foundation, but on the west coast (Clayoquot and Nootka/Esperanza) there were no regulations to compel licence holders to keep to the spirit of the law, "to minimize lice abundance during outmigration" (to below 3 lice/fish). There should have been wellboat use of hydrogen peroxide with lice capture as part of integrated pest management and restriction of SLICE use to once per production cycle.

With the failure in Esperanza/Nootka for the second year in a row, the company is restricted to entering S1s and harvesting in the fall i.e. the fish have to be out before January and the outmigration. This is what I recommended Friday, and without prompting, Simon concluded the same thing. (This makes use of Lufenuron rational.)

In answer to your question Friday: The Messmer et al. (2018) paper using Marine Harvest data linked a lice genotype "directly to the likelihood of treatment survival for a population of Pacific sea lice that show reduced sensitivity to EMB (SLICE)" This lice genotype was at high frequency in Klemtu farms in 2013, coincident with decreased SLICE sensitivity. This lice genotype was found in Quatsino in 2014 and the same frequency as in Klemtu in 2014. There was also "detection" of the genotype in a farm in the Broughton, point being that the problem lice had a greater distribution (and therefore the potential for selection when treating with SLICE in these other areas).

Ian s.19(1)

From: Keith, Ian
Sent: June-24-19 2:02 PM
To: Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Subject: graph by Simon

Hi Adrienne,
I don't know if Simon will include this figure in his presentation, but abundance of female lice on Atlantic salmon in the Broughton 2004-2015, for January, February, March and April, superimposed with pink salmon escapement, shows that

with the 3 motile threshold, farmers are able to stay below threshold and manage burdens during outmigration for all but the exceptional years. The huge pink returns i.e. Fall 2003 and Fall 2014, are anomalous years. If Simon has 2016, 2017, 2018 Broughton data to add to this i.e. pink data and female lice levels, then this is a robust test of the threshold allowing sustainable lice management.

Regulatory medicine is supposed to be conservative, and to change a management threshold requires compelling evidence

X:\AEO\Courtenay\FH\Sea lice files\Jones presentations\broughton sea lice 2015.pptx

For the fate of the wild smolts, the attached file, Jones and Hargraves (2009), use their lethal challenge level from the lab to estimate the proportion of the pink smolts in the Broughton that would receive sufficient intensity of challenge to be lethal.

This isn't comprehensive, but you could say that Nathan is maintaining the chum monitoring program on the west coast (no pinks on the west coast and chum are also small as smolts) and whatever monitoring is occurring by industry.

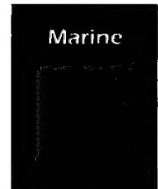
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Method paper

A 200K SNP chip reveals a novel Pacific salmon louse genotype linked to differential efficacy of emamectin benzoate



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ABSTRACT

Antiparasitic drugs such as emamectin benzoate (EMB) are relied upon to reduce the parasite load, particularly of the sea louse *Lepeophtheirus salmonis*, on farmed salmon. The decline in EMB treatment efficacy for this purpose is an important issue for salmon producers around the world, and particularly for those in the Atlantic Ocean where widespread EMB tolerance in sea lice is recognized as a significant problem. Salmon farms in the Northeast Pacific Ocean have not historically experienced the same issues with treatment efficacy, possibly due to the relatively large population of endemic salmonid hosts that serve to both redistribute surviving lice and dilute populations potentially under selection by introducing naïve lice to farms. Frequent migration of lice among farmed and wild hosts should limit the effect of farm-specific selection pressures on changes to the overall allele frequencies of sea lice in the Pacific Ocean. A previous study using microsatellites examined *L. salmonis oncorhynchii* from 10 Pacific locations from wild and farmed hosts and found no population structure. Recently however, a farm population of sea lice was detected where EMB bioassay exposure tolerance was abnormally elevated. In response, we have developed a Pacific louse draft genome that complements the previously-released Atlantic louse sequence. These genomes were combined with whole-genome re-sequencing data to design a highly sensitive 201,279 marker SNP array applicable for both subspecies (90,827 validated Pacific loci; 153,569 validated Atlantic loci). Notably, kmer spectrum analysis of the re-sequenced samples indicated that Pacific lice exhibit a large within-individual heterozygosity rate (average of 1 in every 72 bases) that is markedly higher than that of Atlantic individuals (1 in every 173 bases). The SNP chip was used to produce a high-density map for Atlantic sea louse linkage group 5 that was previously shown to be associated with EMB tolerance in Atlantic lice. Additionally, 478 Pacific louse samples from farmed and wild hosts obtained between 2005 and 2014 were also genotyped on the array. Clustering analysis allowed us to detect the apparent emergence of an otherwise rare genotype at a high frequency among the lice collected from two farms in 2013 that had reported elevated EMB tolerance. This genotype was not observed in louse samples collected from the same farm in 2010, nor in any lice sampled from other locations prior to 2013. However, this genotype was detected at low frequencies in louse samples from farms in two locations reporting elevated EMB tolerance in 2014. These results suggest that a rare genotype present in Pacific lice may be locally expanded in farms after EMB treatment. Supporting this hypothesis, 437 SNPs associated with this genotype were found to be in a region of linkage group 5 that overlaps the region associated with EMB resistance in Atlantic lice. Finally, five of the top diagnostic SNPs within this region were used to screen lice that had been subjected to an EMB survival assay, revealing a significant

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¹ Contributed equally to this work.

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